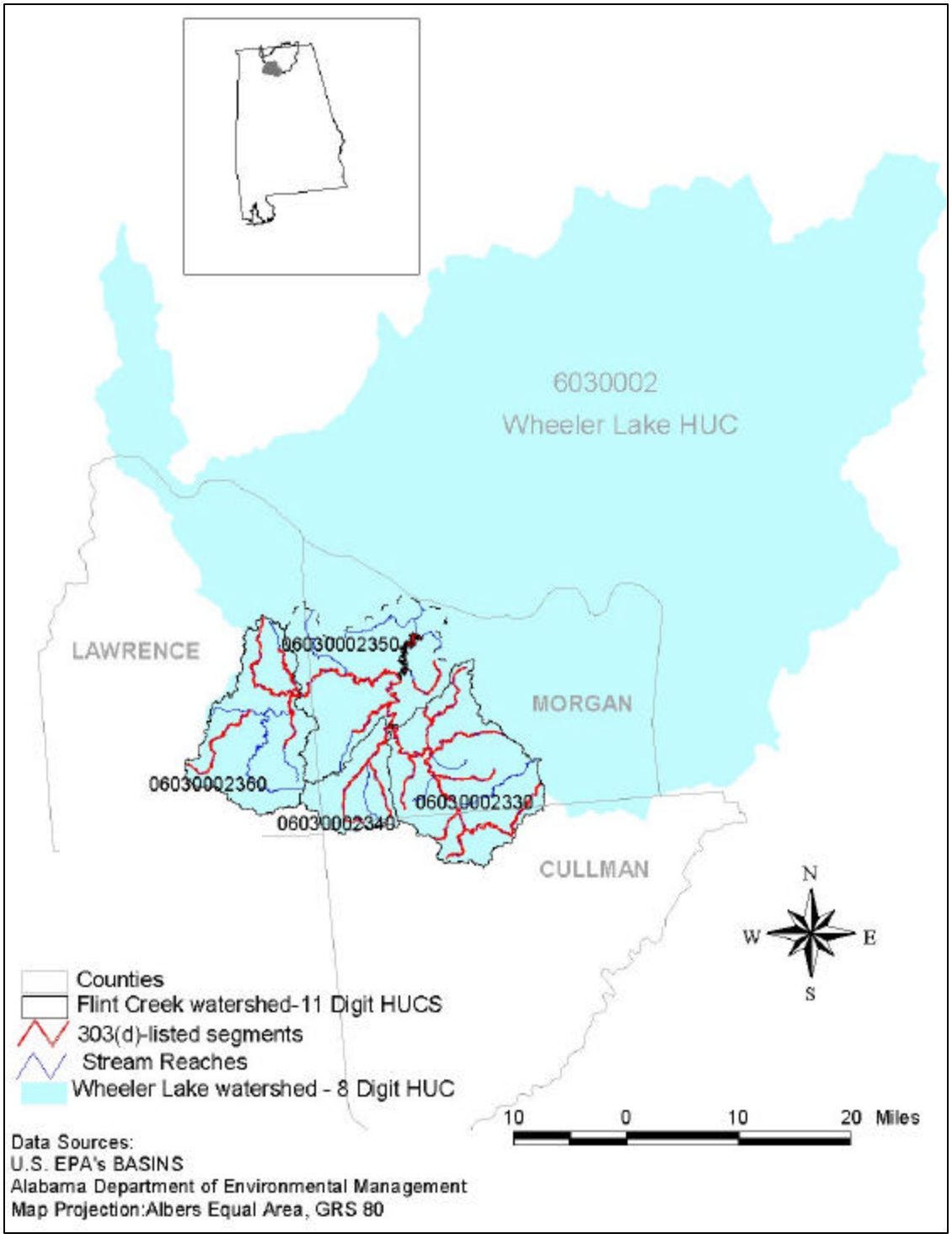
Draft Total Maximum Daily Load for Pathogens

Flint Creek Watershed

November 5, 2001

Flint Creek Watershed (06030002360, 06030002350, 06030002340, 06030002330) in the Wheeler Lake Basin (06030002)



LIST OF ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
BASINS	Better Assessment Science Integrating Point and Nonpoint Sources
CFS	Cubic Feet per Second
CWP	Clean Water Partnership Program
DEM	Digital Elevation Model
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
FCLES	Fecal Coliform Loading Estimation Spreadsheet
GIS	Geographic Information System
HUC	Hydrologic Unit Code
LA	Load Allocation
LSPC	Loading Simulation Program in C++
MOS	Margin of Safety
MRLC	Multi-Resolution Land Characteristic
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
SWCA	Soil and Water Conservation Assessment
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WCS	Watershed Characterization System
WLA	Waste Load Allocation
WWTP	Wastewater Treatment Plant

Table of Contents

List of Figures

List of Tables

1 Executive Summary

The Flint Creek watershed is located in the northwest portion of Alabama and is a major tributary to the Wheeler Lake Reservoir. The Flint Creek watershed is approximately 290,000 acres (453 square miles). The majority of the watershed is in Morgan County with portions of it also in Cullman and Lawrence counties. The major populated areas in the watershed are Decatur, Hartselle, and Falkville.

Eighteen stream segments in the Flint Creek watershed are on the state of Alabama's 1998 §303(d) list of impaired waterbodies. These stream segments are listed for pollutants including siltation, organic enrichment, low dissolved oxygen, pathogens, nutrients, and ammonia. This report presents only the pathogen TMDLs. There is a total of 115.2 stream miles listed in the Flint Creek watershed for pathogen impairments.

Fecal coliform data from 1995 through 1997 were used in the TMDL analyses. The data were compiled by the Alabama Department of Environmental Management (ADEM).

The following report addresses the results of the TMDL analysis for pathogens in the Flint Creek watershed. In accordance with ADEM water quality criterion, the bacteria of the fecal coliform group shall not exceed a geometric mean of 1,000 per 100 milliliter during October to May and 200 per milliliter from June to September; nor exceed a maximum of 2,000 per 100 milliliter in any sample in a stream classified as Fish and Wildlife. Table 1-1 presents the TMDLs for the subwatersheds in the Flint Creek watershed.

Based on the watershed assessment and characterization, high fecal coliform levels in the embayment are attributed to elevated inflow fecal coliform levels from agricultural activities in the upstream tributaries to the Flint Creek embayment. Due to the nature of the water body and the surrounding land uses and activities, there are little to no cattle, poultry, or swine operations in the vicinity of the embayment; therefore, there are no direct deposits from cattle into the embayment, as in the case of the upstream reaches. After calculating the TMDL for the upstream reaches, the modeling analysis shows that no further reductions from the immediate area adjacent to the embayment are required in order to meet the fecal coliform standard in the embayment.

Table 1-1. Maximum allowable pollutant loads by source

Subwatershed	Stream Name	Pollutant	Point Source Loads* (counts/hour)	Non-point Source Loads (counts/hour)
1	Flint Creek Embayment	Fecal Coliform	No TMDL Necessary	
2	Flint Creek Embayment	Fecal Coliform	No TMDL Necessary	
3	Flint Creek Embayment	Fecal Coliform	No TMDL Necessary	
4	Flint Creek Embayment	Fecal Coliform	No TMDL Necessary	
5	Flint Creek	Fecal Coliform	0.00E+00	1.15E+12

Subwatershed	Stream Name	Pollutant	Point Source Loads* (counts/hour)	Non-point Source Loads (counts/hour)
	Embayment			
6	Flint Creek Embayment	Fecal Coliform	0.00E+00	5.08E+10
7	Flint Creek Embayment	Fecal Coliform	0.00E+00	8.79E+11
8	Flint Creek Embayment	Fecal Coliform	0.00E+00	1.22E+10
9	Flint Creek	Fecal Coliform	0.00E+00	5.70E+11
10	Flint Creek	Fecal Coliform	0.00E+00	5.05E+10
11	No Business Creek	Fecal Coliform	0.00E+00	2.26E+12
12	No Business Creek	Fecal Coliform	0.00E+00	1.98E+12
13	Flint Creek	Fecal Coliform	0.00E+00	6.71E+11
14	Crowdabout Creek	Fecal Coliform	0.00E+00	1.20E+12
15	Crowdabout Creek	Fecal Coliform	0.00E+00	2.17E+11
16	Herrin Creek	Fecal Coliform	0.00E+00	1.10E+12
17	Crowdabout Creek	Fecal Coliform	0.00E+00	5.41E+08
18	Jones Creek	Fecal Coliform	0.00E+00	1.21E+12
19	Crowdabout Creek	Fecal Coliform	0.00E+00	2.07E+12
20	Flint Creek	Fecal Coliform	0.00E+00	1.65E+11
21	Flint Creek	Fecal Coliform	0.00E+00	6.06E+11
22	Mack Creek	Fecal Coliform	0.00E+00	1.22E+12
23	Flint Creek	Fecal Coliform	0.00E+00	4.48E+10
24	Flint Creek	Fecal Coliform	0.00E+00	5.85E+11
25	Shoal Creek	Fecal Coliform	1.58E+10	2.84E+11
26	Town Branch	Fecal Coliform	0.00E+00	1.55E+11
27	Shoal Creek	Fecal Coliform	0.00E+00	1.30E+12
28	Flint Creek	Fecal Coliform	0.00E+00	7.77E+09
29	Cedar Creek	Fecal Coliform	0.00E+00	2.97E+12
30	Flint Creek	Fecal Coliform	0.00E+00	5.79E+09
31	Painter Branch	Fecal Coliform	0.00E+00	8.08E+11
32	Flint Creek	Fecal Coliform	9.79E+09	3.21E+11
33	Robinson Creek	Fecal Coliform	0.00E+00	1.21E+12
34	Flint Creek	Fecal Coliform	0.00E+00	4.73E+09
35	Jones Branch	Fecal Coliform	0.00E+00	6.30E+11
36	Flint Creek	Fecal Coliform	0.00E+00	8.98E+11
37	Indian Creek	Fecal Coliform	0.00E+00	4.93E+11
38	Flint Creek	Fecal Coliform	0.00E+00	8.61E+08
39	Mill Creek	Fecal Coliform	0.00E+00	1.36E+12
40	Flint Creek	Fecal Coliform	0.00E+00	9.69E+10
41	Rock Creek	Fecal Coliform	0.00E+00	7.68E+11
42	East Fork Flint Creek	Fecal Coliform	0.00E+00	1.63E+12
43	East Fork Flint Creek	Fecal Coliform	0.00E+00	9.94E+11
44	West Flint Creek	Fecal Coliform	0.00E+00	2.00E+11
45	West Flint Creek	Fecal Coliform	0.00E+00	2.95E+11
46	Mud Tavern Creek	Fecal Coliform	0.00E+00	8.72E+11
47	West Flint Creek	Fecal Coliform	0.00E+00	4.43E+11
48	Flat Creek	Fecal Coliform	0.00E+00	6.14E+11
49	West Flint Creek	Fecal Coliform	0.00E+00	1.29E+10

Subwatershed	Stream Name	Pollutant	Point Source Loads* (counts/hour)	Non-point Source Loads (counts/hour)
50	Big Shoal Creek	Fecal Coliform	0.00E+00	1.25E+12
51	West Flint Creek	Fecal Coliform	0.00E+00	9.19E+10
52	McDaniel Creek	Fecal Coliform	0.00E+00	6.25E+11
53	West Flint Creek	Fecal Coliform	0.00E+00	3.20E+11
54	West Flint Creek	Fecal Coliform	0.00E+00	1.94E+12
55	Elam Creek	Fecal Coliform	0.00E+00	2.67E+11
56	Rocky Branch	Fecal Coliform	0.00E+00	4.65E+11
57	Elam Creek	Fecal Coliform	0.00E+00	1.16E+12
58	Elam Creek	Fecal Coliform	0.00E+00	3.10E+11

***** Includes only NPDES permitted loads.

2 Basis for §303(d) Listing

2.1 Introduction

Section 303(d) of the Clean Water Act (CWA) as amended by the Water Quality Act of 1987 and EPA's Water Quality Planning and Management Regulations [(Title 40 of the Code of Federal Regulations (CFR), Part 130)] require states to identify waterbodies which are not meeting water quality criterion applicable to their designated use classifications. The identified waters are prioritized based on severity of pollution with respect to designated use classifications. Total maximum daily loads (TMDLs) for all pollutants causing violation of applicable water quality criterion are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality criterion with seasonal variations and margins of safety. The TMDL process establishes the allowable loading of pollutants, or other quantifiable parameters for a waterbody, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and non-point sources and restore and maintain the quality of their water resources (USEPA, 1991).

The State of Alabama has identified seven stream segments in the Flint Creek watershed as being impaired by pathogens, as reported on the 1998 §303(d) list(s) of impaired waters. These seven listed stream segments encompass 115.2 miles of streams in the Flint Creek watershed. Table 2-1 presents the 1998 303(d) list information for the seven segments listed for pathogen impairment in the watershed. The Flint Creek watershed is located mainly in Morgan County, but portions of the watershed lie in Cullman and Lawrence counties in northwestern Alabama (Figure 2-1).

Table 2-1. 303(d)-listed waterbodies and their corresponding impairments

Listed Segment ID	Stream Name	Length (mi)	Designated Use	Impairments	Sources
AL/06030002-330 01	Flint Creek	40.0	Public Water Supply, Fish & Wildlife, and Agriculture and Industry	Pathogens	Municipal, Nonirrigated crop prod., Pasture grazing, Int. animal feeding oper., Urban runoff/Storm sewers
AL/06030002-330 02	Shoal Creek	10.9	Fish & Wildlife	Pathogens	Urban runoff/Storm sewers, Agriculture
AL/06030002-330 06	Cedar Creek	8.7	Fish & Wildlife	Pathogens	Agriculture
AL/06030002-330 07	E. Fork Flint Creek	14.9	Fish & Wildlife	Pathogens	Unknown Source
AL/06030002-340 01	Crowdabout Creek	15.0	Fish & Widlife	Pathogens	Nonirrigated crop prod., Pasture grazing, Int. animal feeding oper.
AL/06030002-350 01	No Business Creek	6.3	Fish & Wildlife	Pathogens	Nonirrigated crop prod., Pasture grazing
AL/06030002-350 02	West Flint Creek	19.4	Fish & Wildlife	Pathogens	Nonirrigated crop prod., Pasture Grazing, Int. animal feeding oper.

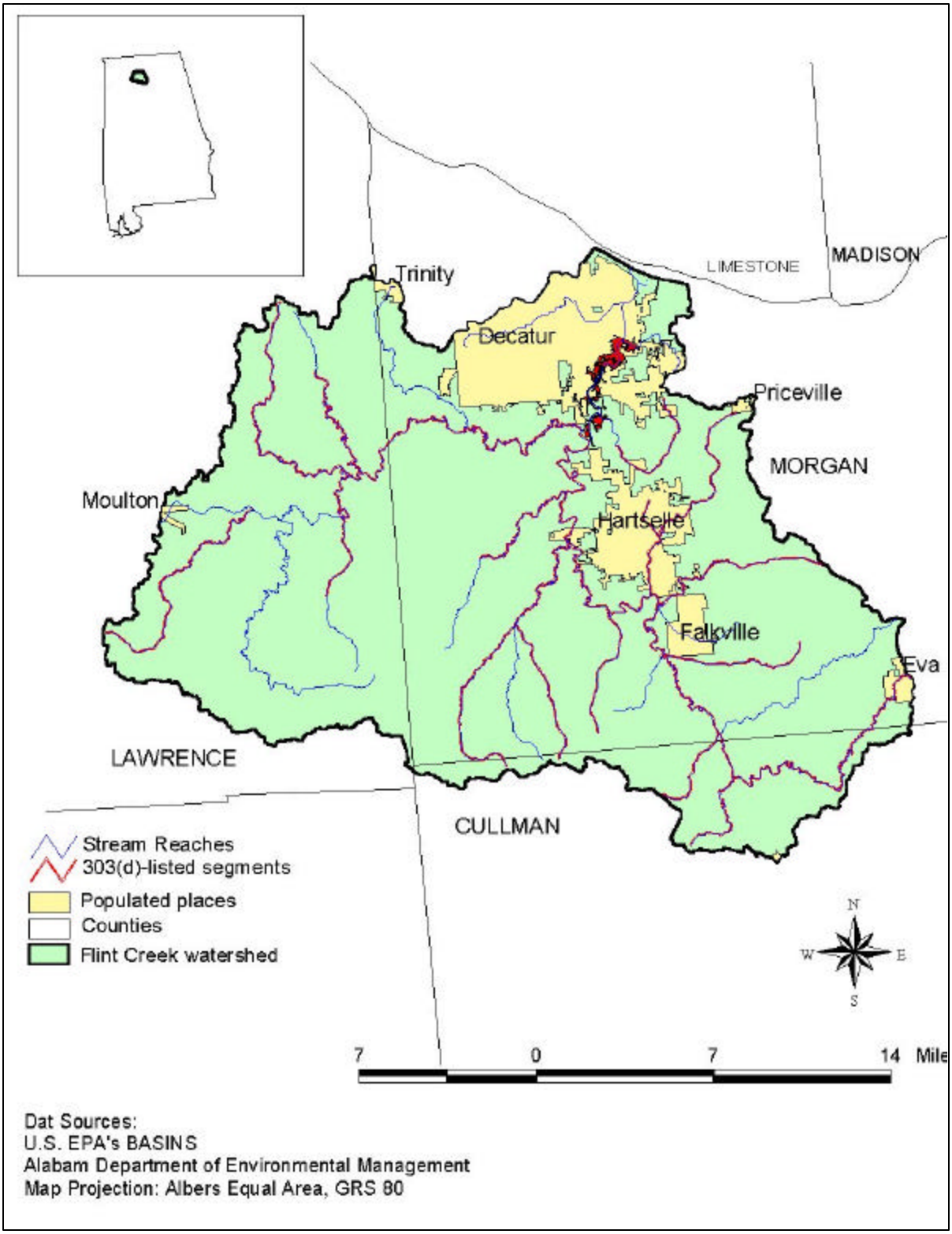


Figure 2-1. Location of the Flint Creek watershed

The TMDLs developed for the Flint Creek watershed illustrate the steps that can be taken to address a waterbody impaired by high pathogen levels. The TMDL is consistent with a phased-approach: estimates are made of needed pollutant reductions, load reduction controls are implemented, and water quality is monitored for plan effectiveness. Flexibility is built into the plan so that load reduction targets and control actions can be reviewed if monitoring indicates continuing water quality problems.

2.2 Water Quality Criteria

Alabama's water quality standards document (ADEM Admin. Code R. 335-6-10-.09-(5)(e)(7.)) has defined water quality criteria for surface waters as a numeric constituent concentration representing a quality of water that supports one or more designated uses of the waterbody. All listed waterbodies in the Flint Creek watershed have been designated as having a fish and wildlife use. Flint Creek has been designated as having public water supply and agriculture and industry uses as well as fish and wildlife. Fecal coliform bacteria are given numeric criteria under the fish and wildlife, public water supply, and agriculture and industry use designation categories. The criterion for fish and wildlife and public water supply are the same and they are both more stringent than the agriculture and industry criterion. Therefore, only the fish and wildlife criterion is used in this TMDL report.

Flint Creek, Shoal Creek, Cedar Creek, East Fork Flint Creek, Crowdabout Creek, No Business Creek, and West Flint Creek are listed for pathogens, but water quality criteria for pathogens do not exist. Fecal coliform bacteria is used as a pathogen indicator. Fecal coliform will be referred to throughout the rest of this report to represent the pathogen impairment. The Alabama water quality criteria for fecal coliform bacteria states "bacteria of the fecal coliform group shall not exceed a geometric mean of 1,000 per 100 milliliters; nor exceed a maximum of 2,000 per 100 milliliters in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean fecal coliform organism density does not exceed 100 per 100 milliliters in coastal waters and 200 per 100 milliliters in other waters. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric mean fecal coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports."

3 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

The water quality target for pathogen TMDLs is determined by the stream's use classification and the water quality criterion described in Section 2.2. The pathogen TMDL will be based on the state's criterion for bacteria, specifically fecal coliform as the indicator bacteria. Fecal coliform is a good indicator of pathogens from animal and human feces. Due to recreational contact in the summer months, there is a seasonal variation of the water quality criterion. Therefore, the target is based on in-stream fecal coliform concentrations and the target varies seasonally. The water quality criterion has two forms of compliance. First, the instantaneous fecal coliform concentration shall not exceed a maximum of 2,000 per 100 milliliters. Second, the geometric mean of the fecal coliform concentration shall not exceed 1,000 per 100 milliliters during October to May and 200 per 100 milliliters during June to September. The geometric mean fecal coliform criterion was used as the water quality target for the Flint Creek watershed TMDLs.

3.2 Source Assessment

A source assessment is an important part of defining the TMDL for any pollutant. The data and the sources have to be understood to be able to distinguish between point and nonpoint source impacts. Typically, the point source impacts can be quantified through permit limits and/or direct measurements at a certain location. A source assessment was performed on the Flint Creek watershed to determine the predominant sources of fecal coliform loading into the system. The Watershed Characterization System (WCS) was used to develop characterization reports, tables, and figures for the watershed. WCS was developed by EPA Region 4 to facilitate these types of data gathering for TMDL report writing. The WCS is an ArcView based program that has multiple datasets for Region 4 states. Datasets include population data (human and livestock), county and state borders, watershed boundaries, agricultural census data, roads, land use coverages, stream networks and characteristics, National Pollutant Discharge Elimination System (NPDES) permitted locations, soil types and characteristics, and elevation maps. The WCS has built-in tools that allow for characterizations to occur at any watershed level. This section of the report examines and identifies the potential sources of fecal coliform in the Flint Creek watershed. A wide range of data were used to identify potential sources and to characterize the relationship between point and nonpoint source discharges and in-stream response at monitoring stations.

3.2.1 General Sources of Fecal Coliform

Fecal coliform loadings can be derived from point and nonpoint sources. A point source can be defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source contributions can typically be attributed to municipal wastewater facilities, illicit discharges, and leaking sewers in urban areas.

Municipal wastewater treatment facilities are permitted through the NPDES. Larger treatment facilities have chlorination systems that remove fecal coliform bacteria in the effluent before it is discharged. The treatment facilities treat human waste received from the collection system and then discharge their effluent into a nearby stream. Illicit discharges are facilities that are currently discharging fecal coliform bacteria when they are not permitted or they are violating their defined permit limit by exceeding the fecal coliform concentration.

In urban settings, sewer lines can typically run parallel to the stream in the floodplain. If there is a leaking sewer line, high concentrations of fecal coliform can flow into the stream or leach into the groundwater. Groundwater monitoring wells can signal if there are leaking sewer lines contributing to the problem.

Nonpoint sources of fecal coliform bacteria do not have one discharge point, but rather, occur over the entire length of a stream or waterbody. On the land surface, fecal coliform bacteria is built up over time in the sediments and then washed off through rain events. As the runoff transports the sediment over the land surface, more fecal coliform bacteria is collected and carried to the stream. At the same time as the accumulation of fecal coliform bacteria is occurring, the bacteria is also dying and decaying. Therefore, there is some net loading into the stream and is dictated by the watershed hydrology. The nonpoint sources of fecal coliform can be quantified from the following list of contributors:

- Livestock grazing
- Manure application to row crops and/or pasture
- Confined Animal Feeding Operations (CAFOs)
- Animals having direct access to streams
- Wildlife in agricultural and forested areas
- Urban runoff
- Failing septic systems in rural areas

Agricultural animals are a potential source of several types of fecal coliform loading to streams in the Flint Creek watershed. Livestock data are reported by county and published by the USDA in the Census of Agriculture (USDA, 1997). The available livestock data include population estimates for beef cows, dairy cows, hogs, and poultry (chickens).

Agricultural livestock and other unconfined animals (i.e., deer and other wildlife) also often have direct access to streams that pass through pastures. When cattle are not denied access to stream reaches, they represent a major potential source of direct fecal coliform loading to the stream. To account for the potential influence of cattle loads deposited directly in stream reaches within the watersheds, fecal coliform loads from cattle in streams can be calculated as a direct source into the stream.

Wildlife deposit feces onto land surfaces where it can be transported during storm events to nearby streams. Wildlife deposits can be from a wide range of species in Alabama, but common wildlife includes deer, raccoons, and waterfowl.

Fecal coliform loading from urban areas is potentially attributable to multiple sources including storm water runoff, illicit discharges of sanitary waste, runoff from improper disposal of waste materials, leaking septic systems, and domestic animals. Septic systems are common in unincorporated portions of watersheds and may be direct or indirect sources of bacterial pollution via ground and surface waters. Onsite septic systems have the potential to deliver fecal coliform bacteria loads to surface waters due to system failure and malfunction.

3.2.2 Point Sources in the Flint Creek Watershed

ADEM maintains a database of current NPDES permits and GIS files that locate each permitted outfall. This database includes municipal, semi-public/private, industrial, mining, and industrial storm water. CAFO permits are included in the nonpoint source loads. There are two permitted municipal facilities in the Flint Creek watershed that are included as potential sources of fecal coliform to the watershed. These two municipal point sources do not have permit limits for fecal coliform, but for the purpose of this study, it was assumed that they are discharging fecal coliform at the Alabama NPDES criterion for fecal coliform of 200 counts per 100 milliliter. Table 3-1 presents the facility information. Figure 3-1 presents the locations of the two municipal facilities in the watershed.

Table 3-1. Permitted point sources in the Flint Creek watershed

NPDES Number	Facility Name	Status	Receiving Water body	Permit Limit	Average Flow (cfs)
AL0021113	Falkville	Active	Flint Creek	200 counts/100 mL	2.00
AL0054674	Hartselle	Active	Shoal Creek	200 counts/100 mL	3.24

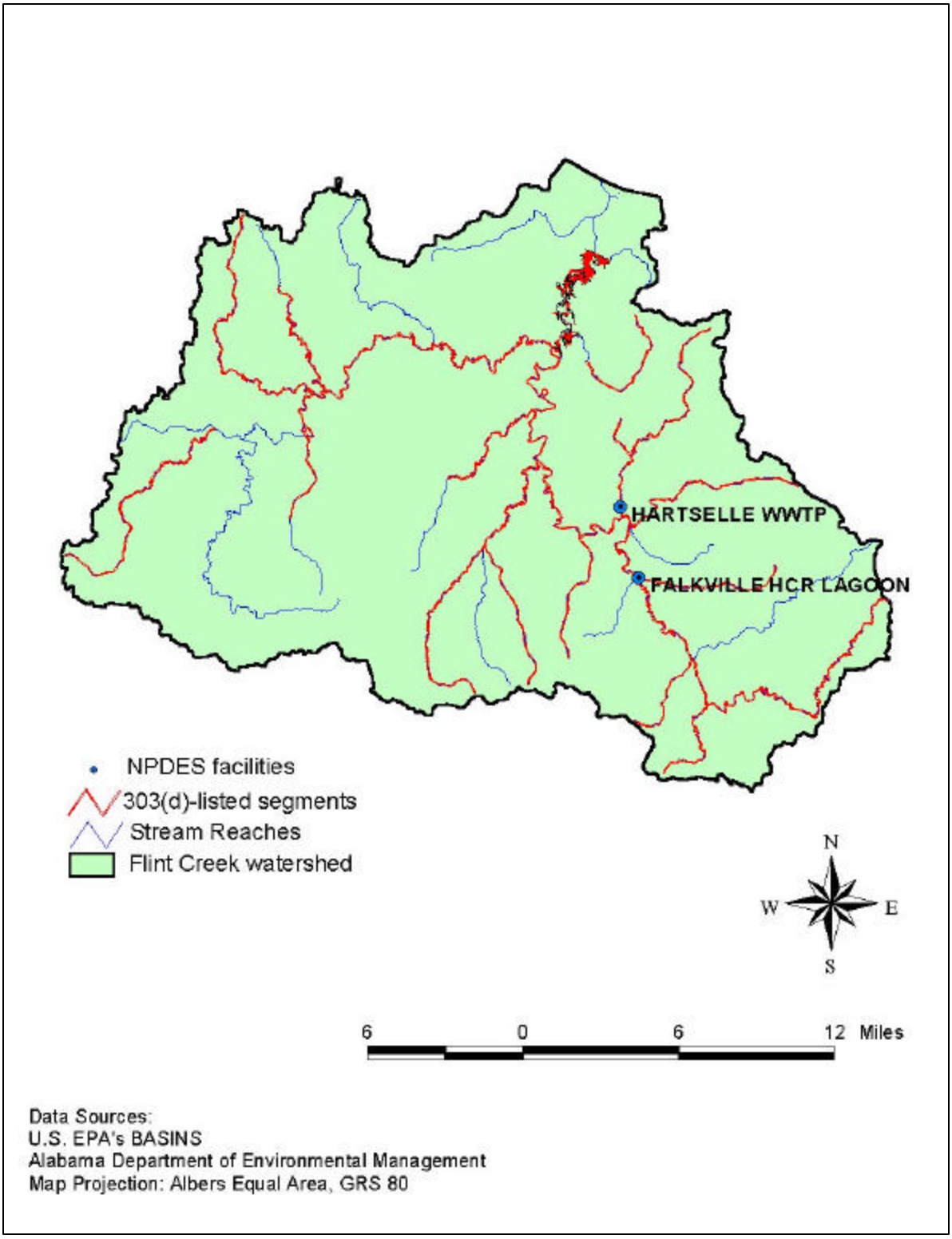


Figure 3-1. Municipal point sources in the Flint Creek watershed

3.2.3 Nonpoint Sources in the Flint Creek Watershed

The land use distribution in the Flint Creek watershed is important when determining nonpoint sources of fecal coliform contributions. The predominant land uses in the Flint Creek watershed were identified based on the USGS's Multi-Resolution Land Characterization (MRLC) land use data (representative of the mid-1990s). According to the MRLC data, the major land uses in the watershed are forested land, which constitutes approximately 47 percent of the watershed area and agricultural land (cropland and pasture), which constitutes 42 percent of the watershed. Table 3-2 displays the land use distribution by subwatershed. Figure 3-2 shows the land use coverage for the entire watershed.

Table 3-2. Land use distribution in the Flint Creek watershed (acres)

Sub-watershed	Barren	Cropland	Forest	Pasture	Strip Mining	Urban	Wetlands	Harvested	Total Acres
1	0.0	12.3	170.1	68.4	0.0	7.0	17.5	1.8	277.2
2	7.0	378.9	1923.1	1185.9	0.0	2231.4	250.9	22.4	5999.5
3	0.0	10.5	265.5	12.3	0.0	21.1	49.1	2.9	361.4
4	0.0	647.3	877.0	591.2	0.0	122.8	64.9	10.6	2313.8
5	0.0	1422.7	2885.6	2005.1	0.0	773.6	812.2	33.5	7932.7
6	0.0	15.8	466.2	87.7	0.0	7.0	207.0	5.7	789.4
7	89.5	684.2	4308.1	1157.8	0.0	189.5	387.7	53.0	6869.6
8	0.0	14.0	294.8	12.3	0.0	7.0	84.2	3.4	415.8
9	0.0	268.4	1283.5	912.2	0.0	28.1	122.8	14.6	2629.6
10	0.0	15.8	71.0	87.7	0.0	1.8	10.5	0.9	187.7
11	0.0	1941.9	3359.4	4697.9	0.0	35.1	2494.5	38.6	12567.4
12	36.8	2517.3	2681.3	3412.0	0.0	50.9	1368.3	15.4	10082.1
13	0.0	445.6	1906.2	957.8	0.0	378.9	249.1	21.7	3959.3
14	0.0	989.4	973.2	2463.0	0.0	10.5	1150.8	10.9	5597.8
15	0.0	233.3	241.3	398.2	0.0	1.8	345.6	2.6	1222.7
16	7.0	487.7	1825.5	1742.0	0.0	8.8	242.1	23.1	4336.2
17	0.0	1.8	1.7	0.0	0.0	0.0	7.0	0.0	10.5
18	7.0	642.1	3061.1	1833.2	0.0	7.0	456.1	42.1	6048.6
19	157.9	1594.6	6844.4	4320.7	0.0	19.3	919.2	73.9	13930.0
20	0.0	138.6	342.0	198.2	0.0	3.5	122.8	3.6	808.7
21	0.0	468.4	975.0	1326.2	0.0	7.0	417.5	10.9	3205.0
22	0.0	877.1	2156.6	1664.8	0.0	5.3	259.6	23.9	4987.3
23	0.0	33.3	235.7	47.4	0.0	5.3	10.5	2.9	335.1
24	0.0	480.7	831.6	745.6	0.0	54.4	171.9	10.4	2294.6
25	0.0	305.2	675.4	307.0	0.0	484.2	24.6	8.8	1805.1
26	0.0	66.7	299.6	128.1	0.0	475.4	7.0	3.9	980.6

Sub-watershed	Barren	Cropland	Forest	Pasture	Strip Mining	Urban	Wetlands	Harvested	Total Acres
27	0.0	1333.2	3836.4	1452.5	0.0	307.0	254.4	49.3	7232.7
28	0.0	0.0	93.6	0.0	0.0	0.0	47.4	1.1	142.1
29	71.9	1964.8	7255.6	4294.4	0.0	229.8	350.8	91.2	14258.5
30	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	7.0
31	1.8	342.1	963.5	1338.5	0.0	196.5	80.7	11.9	2934.8
32	0.0	178.9	346.7	487.7	0.0	1.8	147.4	4.1	1166.6
33	3.5	675.4	2893.9	1870.0	217.5	152.6	157.9	34.0	6004.8
34	0.0	0.0	3.5	1.8	0.0	0.0	8.8	0.0	14.0
35	0.0	331.6	889.9	985.9	0.0	3.5	63.2	10.0	2284.0
36	19.3	566.6	5573.6	1322.7	103.5	50.9	403.5	74.4	8114.4
37	52.6	342.1	2136.6	664.9	0.0	52.6	45.6	51.8	3346.2
38	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	1.8
39	94.7	884.1	9920.3	1970.0	0.0	7.0	56.1	116.6	13049.0
40	19.3	77.2	1188.0	128.1	0.0	5.3	22.8	28.7	1469.4
41	0.0	433.3	1941.2	1177.1	0.0	36.8	0.0	53.4	3641.8
42	38.6	1354.3	5764.3	2124.4	0.0	135.1	1.8	148.3	9566.7
43	0.0	812.2	3090.4	1296.4	0.0	5.3	3.5	64.3	5272.1
44	0.0	287.7	3491.9	740.3	0.0	87.7	968.3	39.4	5615.3
45	1.8	529.8	3254.4	1592.9	0.0	12.3	673.6	38.3	6103.0
46	0.0	905.2	5752.8	1685.8	0.0	114.0	514.0	55.0	9026.8
47	0.0	1047.3	4034.2	2550.7	0.0	15.8	756.1	28.4	8432.4
48	0.0	1426.2	2052.0	2101.6	0.0	119.3	308.7	2.2	6010.0
49	0.0	19.3	71.8	78.9	0.0	0.0	19.3	0.1	189.5
50	0.0	1803.4	4361.2	5189.1	0.0	131.6	1091.1	5.1	12581.4
51	0.0	163.1	401.2	540.3	0.0	0.0	273.7	0.5	1378.8
52	15.8	1459.5	3100.1	3213.8	0.0	21.1	357.9	4.2	8172.3
53	0.0	422.8	751.7	1231.5	0.0	0.0	347.3	0.9	2754.2
54	482.4	2668.2	13842.2	4634.7	0.0	28.1	1682.3	16.3	23354.2
55	0.0	554.3	483.6	857.8	0.0	10.5	205.2	0.5	2112.1
56	26.3	871.9	1130.2	1566.5	0.0	3.5	466.6	1.3	4066.3
57	1.8	2006.9	1526.2	3015.5	0.0	15.8	1145.5	1.8	7713.4
58	0.0	128.1	2959.6	791.2	0.0	8.8	335.1	3.4	4226.0
Total	**1135.0**	**38282.9**	**132065.7**	**79269.0**	**321.0**	**6688.9**	**21049.2**	**1377.8**	**280189.5**
Percentage	**0.4%**	**13.7%**	**47.1%**	**28.3%**	**0.1%**	**2.4%**	**7.5%**	**0.5%**	

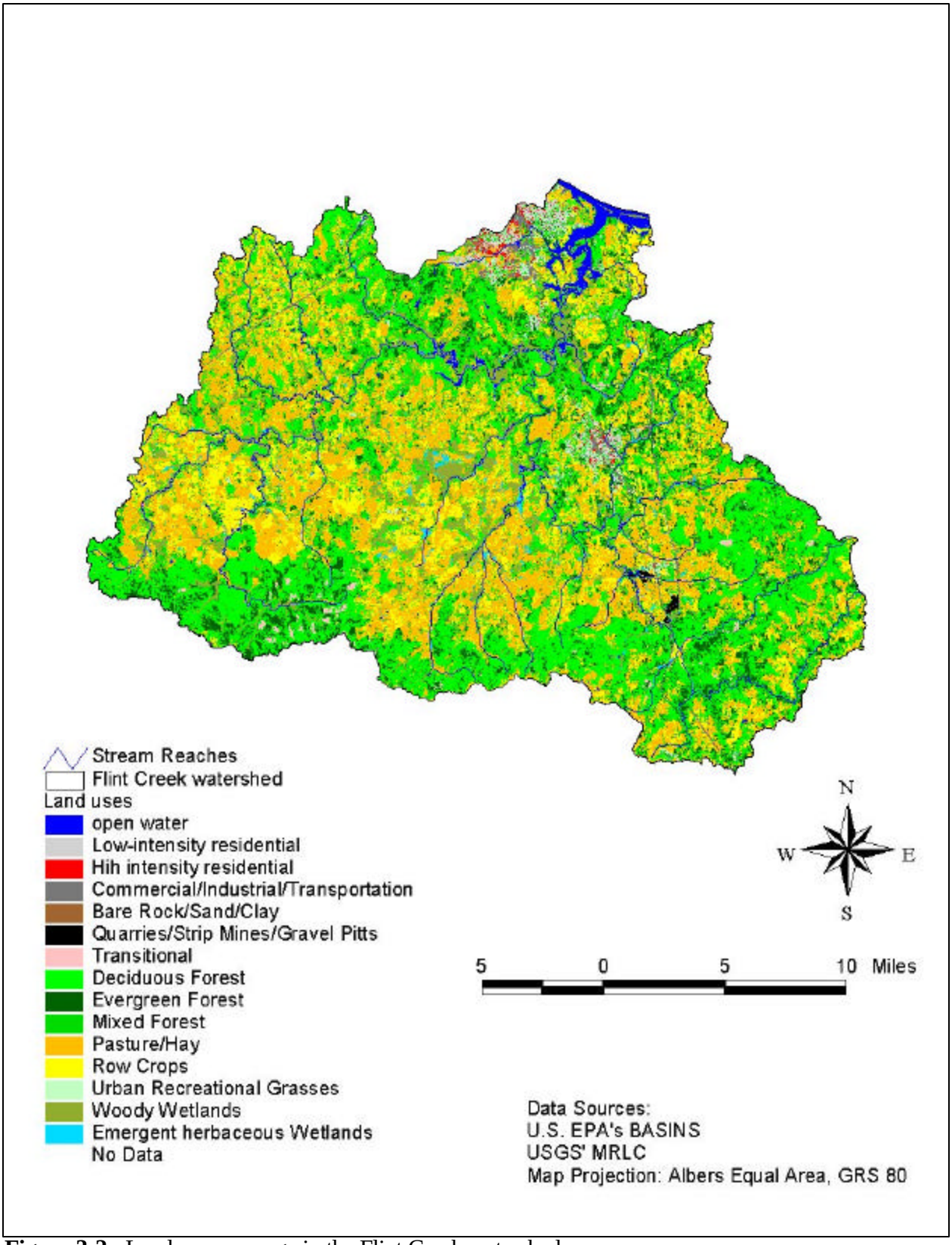


Figure 3-2. Land use coverage in the Flint Creek watershed

Grazing Livestock

Agricultural runoff from cropland and pasture can often contribute increased fecal coliform loads to a water body when poor farm management practices allow animal waste to be washed into the stream, increasing in-stream fecal coliform levels.

Grazing cattle and other agricultural animals deposit manure and, therefore, fecal coliform on the land surface, where it is available for washoff and delivery to receiving water bodies. Although specific information regarding agricultural management practices and activities are not readily available, ADEM keeps a database of agricultural and land use information provided by the various Soil and Water Conservation Districts throughout the state. The database is called the Soil and Water Conservation Assessment (SWCA) Database and contains information based on the 1997 Agricultural Census. Data from the SWCA database provided estimates of livestock in the Flint Creek watershed. Total pastureland and cropland within the watershed was provided by the MRLC land use coverage. The livestock counts and agricultural areas were used to determine livestock densities (e.g., number of cows, hogs, and chickens per acre of pasture land and/or cropland) for the watershed. The area of pastureland and cropland in each subwatershed was determined using GIS data layers. The pasture and cropland area of the subwatersheds and the livestock density for each subwatershed were used to calculate the livestock counts within each subwatershed. The number of chickens were split between cropland and pasture by area weighting and were distributed evenly over both land uses. Dairy cows were distributed evenly over pasture and hogs were distributed evenly over cropland.

The total livestock counts for the Flint Creek watershed are presented in Table 3-3. Livestock counts per subwatershed are presented in Appendix A.

Table 3-3. Livestock counts in the Flint Creek watershed

Beef Cattle	Dairy Cows	Hogs	Chickens
42,578	2,900	2,000	9,480,123

Source: Soil and Water Conservation Assessment Database

Failing Septic Systems

Septic systems are common in unincorporated portions of the watershed and may be direct or indirect sources of bacterial pollution via ground and surface waters. A high percentage of the citizens in the Flint Creek watershed rely on septic systems for wastewater treatment (Bureau of the Census 2000). The information in the aforementioned SWCA database contains numbers and failure rates of septic systems in each of the four 11-digit HUCs in the Flint Creek watershed. Onsite septic systems have the potential to deliver fecal coliform bacteria loads to surface waters due to system failure and malfunction. To evaluate this loading, it is necessary to evaluate where septic tanks are located and what proportion of septics is malfunctioning.

The number of septic systems in the Flint Creek watershed were provided by ADEM, but the spatial distribution of septic tanks is not known. The density of septic systems (number per acre) was determined for each 11-digit HUC within the Flint Creek watershed based on the total number of septics provided within each HUC. It was assumed that septic systems are distributed

evenly throughout the watershed. After estimating the number of septic systems per subwatershed, the number of failing systems per subwatershed were determined in order to calculate bacteria loading. Appendix B presents the number of septic systems and the septic system failure rate assumed for each of the subwatersheds.

Wildlife

Wildlife is another potential source of fecal coliform loading to receiving waterbodies. For modeling purposes, the deer population is assumed to represent the wildlife contribution, since population data for other wildlife species in the watershed was not readily available. It is assumed that deer habitat within the watershed includes forest, cropland, pasture, and wetlands. Typical estimates for the distribution of white-tailed deer within the region were provided by the Alabama Department of Conservation, Division of Wildlife and Freshwater Fisheries (2000). The provided density (deer per square mile) was applied to deer habitat areas within the watershed to estimate population counts by subwatershed. The Flint Creek watershed typically has 15 or less deer per square mile. An average density of 7.5 deer per square mile was applied to forest, pasture, and cropland while a density of 15 deer per square mile was applied to wetland areas.

Cattle in the Stream

The SWCA Database provided information stating that livestock access to streams is a concern in the watershed. When cattle are not denied access to stream reaches, they represent a major potential source of direct fecal coliform loading to the stream. To account for the potential influence of fecal coliform loads deposited directly in stream reaches within the watersheds, fecal coliform loads from cattle in streams were calculated and characterized as a direct source of loading to the stream segments. It was assumed that dairy cattle are mostly confined and that only beef cattle have access to streams. To determine the number of cows in the stream at any time, it was assumed that 10 percent of the cows in the watershed have access to streams; that 3 percent of those cows are in or around the stream at any given time; and that 1 percent of those cows in the stream are actually depositing manure in the stream reach at any given time.

3.3 Data Availability and Analysis

A wide range of data and information were used to characterize the watershed. The categories of data used include physiographic data that describe the physical conditions of the watershed and environmental monitoring data that identify potential pollutant sources and their contribution, and in-stream water quality monitoring data. Table 3-4 shows the various data types and data sources used in this model setup.

Table 3-4. Data inventory for the Flint Creek watershed

Data Category	Description	Data Source(s)
Watershed Physiographic Data	Land Use (MRLC) (mid 1990s)	USGS
	Stream Reach Coverage NHD	USGS
	Weather Information	National Climatic Data Center
Environmental Monitoring Data	NPDES Data	ADEM
	303(d)-Listed Waters	ADEM
	Water Quality Monitoring Data for 18 Sampling Stations	ADEM
	Flow Monitoring Data for 2 Sampling Stations	USGS

3.3.1 Stream Flow Data

There are two USGS flow gages with recent observation data in the Flint Creek watershed. Flow data from these gages were used to support flow analysis for the watershed. Table 3-5 shows the flow gaging stations used in this study and the corresponding period of record for each. These stations were the only stations with sufficient data to characterize the stream flow in the watershed. Figure 3-3 shows the location of the USGS flow gages used in TMDL development for the Flint Creek watershed.

Table 3-5. Flow analysis for the Flint Creek watershed (10/1/92-9/30/98)

Station	Stream Name	Drainage Area (square miles)	Start Date	End Date	Min (cfs)	Mean (cfs)	Max (cfs)
3577000	West Flint Creek near Oakville, AL	87.6	9/1/52	9/30/98	0	185	3980
3576500	Flint Creek near Falkville, AL	86.3	8/1/52	9/30/99	0	164	6260

3.3.2 Water Quality Data

There are approximately 18 existing water quality stations in the Flint Creek watershed. ADEM provided water quality monitoring data for the 18 sampling stations from 1995 through 1997. Data from 13 of those stations located on the 7 segments listed for pathogens were analyzed. Figure 3-3 presents the locations of the water quality stations in the Flint Creek watershed. Examination of the fecal coliform data from the 13 stations confirms that water quality criteria were exceeded in all 303(d)-listed stream reaches. All fecal coliform data used in TMDL development for the Flint Creek watershed are presented in Appendix C.

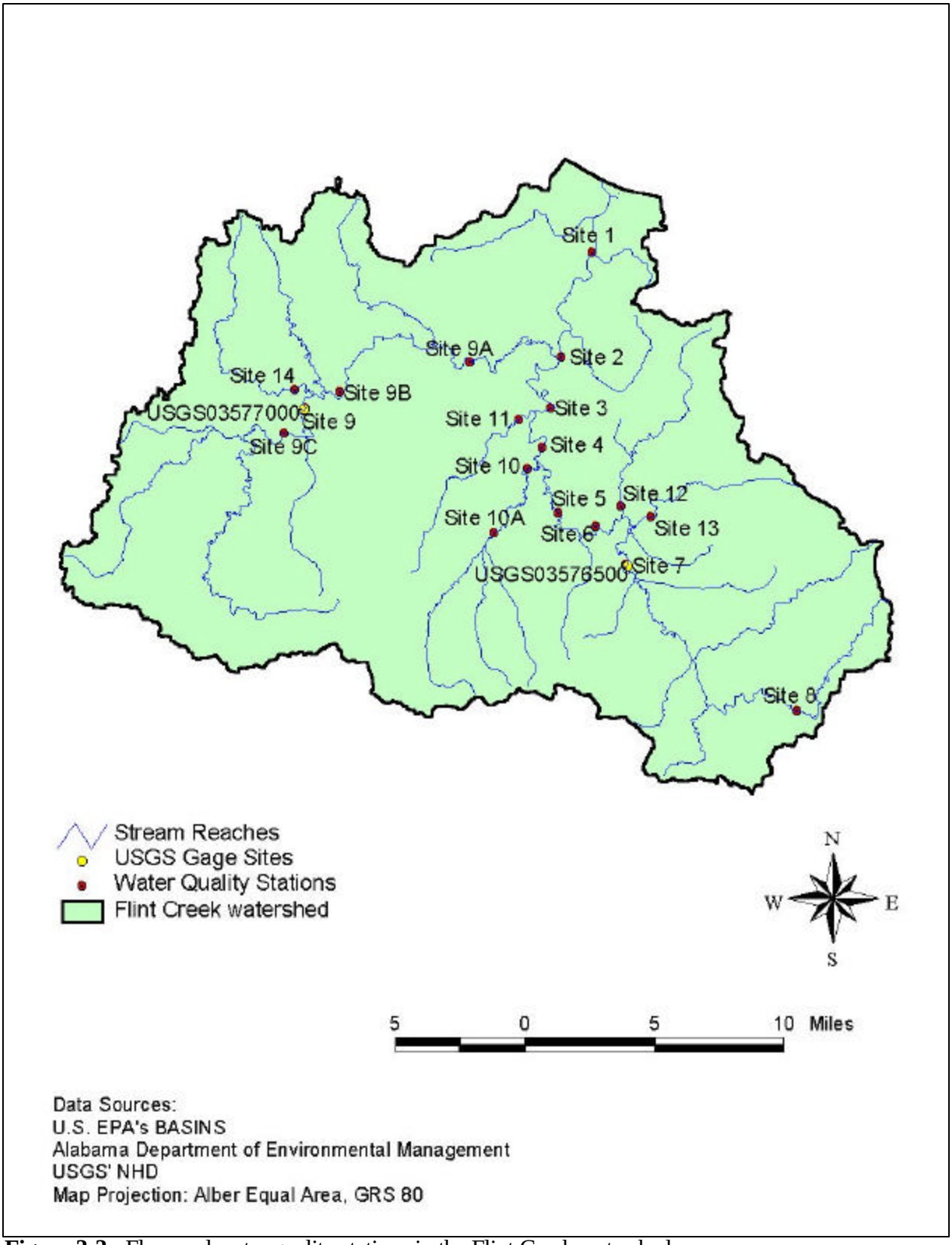


Figure 3-3. Flow and water quality stations in the Flint Creek watershed

4 Hydrology and Water Quality Model Development

Establishing the relationship between in-stream water quality and source loading is an important component of TMDL development. It allows the determination of the relative contribution of sources to total pollutant loading and the evaluation of potential changes to water quality resulting from implementation of various management options. This relationship can be developed using a variety of techniques ranging from qualitative assumptions based on scientific principles to numerical computer modeling. In this section, the numerical modeling techniques developed to simulate fecal coliform bacteria fate and transport in the watershed are discussed.

4.1 Hydrology Model Selection and Setup

Based on the considerations described above, analysis of the monitoring data, review of the literature, and past pathogens modeling experience, the Loading Simulation Program C++ (LSPC) was used to represent the source-response linkage in the Flint Creek watershed. LSPC is a comprehensive data management and modeling system that is capable of representing loading from nonpoint and point sources found in the Flint Creek watershed and simulating in-stream processes. LSPC is based on the Mining Data Analysis System (MDAS), with modifications for non-mining applications such as nutrient and fecal coliform modeling. MDAS was developed by EPA Region 3 through mining TMDL applications in Region 3.

LSPC is a system designed to support TMDL development for areas impacted by nonpoint and point sources. The most critical component of LSPC to TMDL development is the dynamic watershed model, because it provides the linkage between source contributions and in-stream response. The comprehensive watershed model is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and in-stream water quality. It is capable of simulating flow, sediment, metals, nutrients, pesticides, and other conventional pollutants, as well as temperature and pH for pervious and impervious lands and waterbodies. LSPC was configured for the Flint Creek watershed to simulate the watershed as a series of the hydrologically connected subwatersheds. Configuration of the model involved subdivision of the Flint Creek watershed into modeling units and continuous simulation of flow and water quality for these units using meteorological, land use, point source loading, and stream data. The only pollutant simulated was fecal coliform bacteria. This section describes the configuration process and key components of the model in greater detail.

To represent watershed loadings and resulting concentrations of fecal coliform bacteria in the stream segments, the watershed was divided into 58 subwatersheds. These subwatersheds are presented in Figure 4-1, and represent hydrologic boundaries. The division was based on elevation data (7.5 minute Digital Elevation Model [DEM] from USGS), stream connectivity (from the National Hydrography Dataset stream coverage), and the locations of monitoring stations.

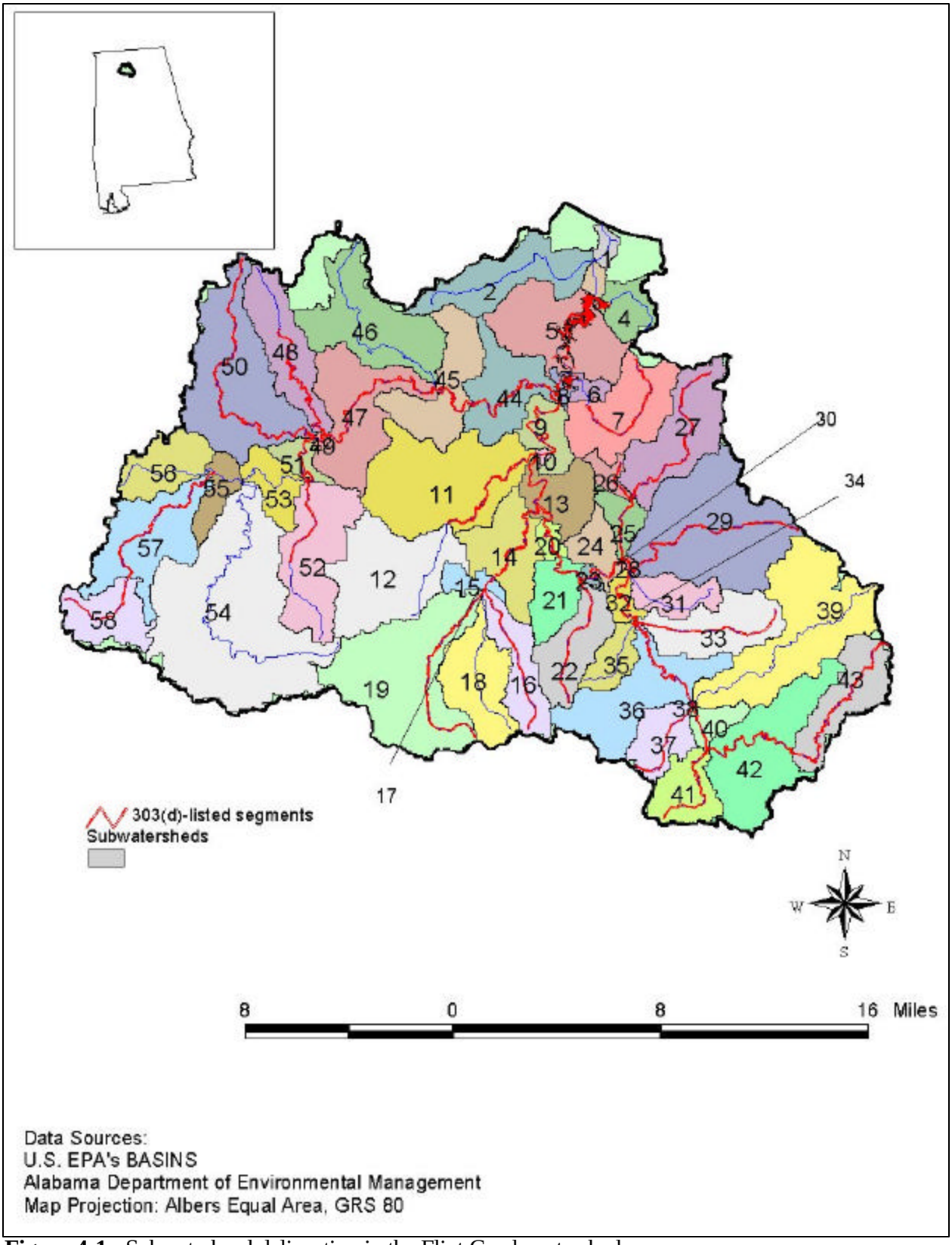


Figure 4-1. Subwaterhsed delineation in the Flint Creek watershed

4.1.1 Meteorological Data

Meteorological data are a critical component of the watershed model. Appropriate representation of precipitation, potential evapotranspiration, cloud cover, temperature, and dewpoint are required to develop a valid model. Meteorological data were accessed from a number of sources in an effort to develop the most representative dataset for the Flint Creek watershed.

In general, hourly precipitation data are recommended for nonpoint source modeling due to the storm sensitive processes. Therefore, only weather stations with hourly-recorded data were considered in development of a representative dataset. Long-term hourly precipitation data available from two National Climatic Data Center (NCDC) weather stations located near the watershed were used (Figure 4-2):

- Haleyville
- Huntsville WSO Airport

The Huntsville weather data were applied to the entire watershed except for subwatersheds 57 and 58, where the Haleyville weather data were applied.

4.1.2 Hydrology Calibration

The hydrology of the LSPC model was calibrated for water year 1998 at USGS gage 3577000 on West Flint Creek. The hydrology calibration was performed prior to water quality calibration and involved adjustment of the model parameters used to represent the hydrologic cycle until acceptable agreement was achieved between simulated flows and historic stream flow data measured at gage 3577000 for the same period of time. Model parameters adjusted include: evapotranspiration, infiltration, upper and lower zone storage, groundwater storage, recession, losses to the deep groundwater system, and interflow discharge. Modeled flow was also compared to observed flow data at gage 3576500 on Flint Creek for validation of the calibration at gage 3577000. The model output was further validated at stations 3577000 and 3576500 for the 7-year period of 1992 through 1998. Modeled flow was also compared to flow observations available at each of the water quality stations. The hydrological calibration and validation plots are presented in Appendix D.

4.2 Water Quality Model Selection and Setup

A dynamic computer model was selected for fecal coliform analysis in order to: a) simulate the time varying nature of fecal coliform deposition on land surfaces and transport to receiving waters; b) incorporate seasonal effects on the production and fate of fecal coliform bacteria; and c) identify the critical condition for the TMDL analysis. Several computer-based tools were also included in the model at a rate of 0.5 per day. This rate represents a literature value reported by Baudisova (1997).

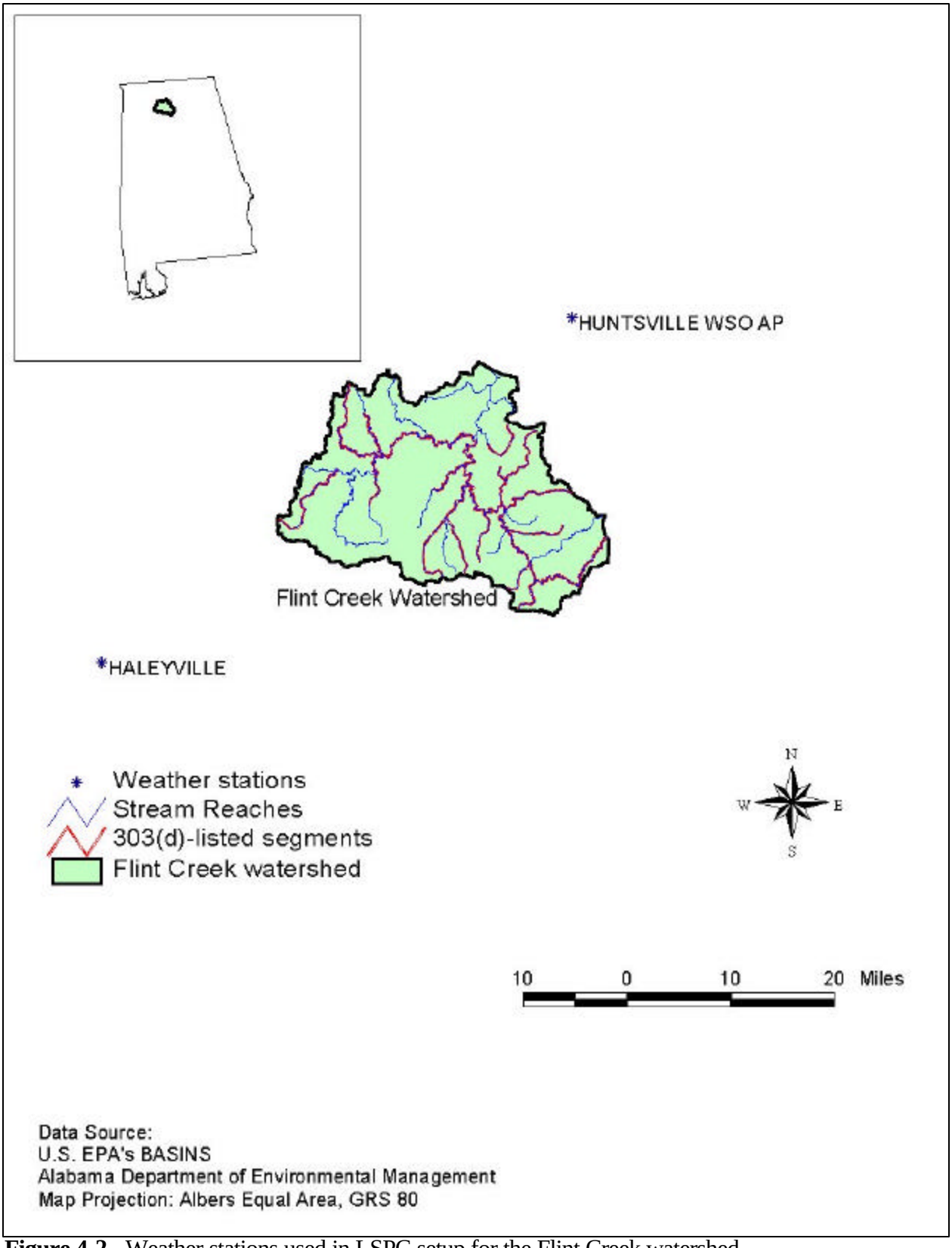


Figure 4-2. Weather stations used in LSPC setup for the Flint Creek watershed

4.2.1 Nonpoint Source Representation

In addition to LSPC, the WCS was used to display, analyze, and compile available information to support water quality model simulations. Results of the WCS characterization are input to a spreadsheet developed by Tetra Tech, Inc. called the Fecal Coliform Loading Estimation Spreadsheet (FCLES). The FCLES is used to estimate modeling parameters associated with fecal coliform buildup and washoff loading rates. The spreadsheet is also used to estimate direct sources of fecal coliform loading to water bodies from leaking/failing septic systems and animals having access to streams, in particular grazing beef cattle. Information from the WCS and spreadsheet tool have been used as initial input for variables in the LSPC model.

For modeling purposes, the fecal coliform sources are represented by the following components:

- runoff loads from land uses (build-up of fecal coliform and washoff due to runoff)
- direct source loads from cattle in the streams and failing septic systems
- point source loads from NPDES permitted discharges

Land-based Runoff

Typically, nonpoint sources are characterized by buildup and washoff processes: they contribute bacteria to the land surface, where they accumulate and are available for runoff during storm events. These nonpoint sources can be represented in the model as land-based runoff from the land use categories to account for their contribution to coliform loading within the watersheds. Fecal coliform accumulation rates (number per acre per day) can be calculated for each land use based on all sources contributing coliform to the surface of the land use. For this study, where specific sources were identified as contributing to a land use, accumulation rates were calculated. For example, grazing livestock and wildlife are specific sources contributing to land uses within the watershed. The land uses that experience bacteria accumulation due to livestock and wildlife include

- Cropland (livestock and wildlife)
- Forest (wildlife)
- Pasture (livestock and wildlife)
- Wetlands (wildlife)

Accumulation rates can be derived using the distribution of animals by land use and using typical fecal coliform production rates for different animal types (Table 4-1). The coliform accumulation rate for pasturelands is the sum of the individual coliform accumulation rates due to contributions from grazing livestock, the application of manure (dairy cows and chickens), and wildlife. The fecal coliform accumulation rate for cropland is the sum of the individual coliform accumulation rates due to contributions form grazing livestock, the application of manure (hogs and chickens), and wildlife.

Table 4-1. Fecal coliform production rates for various animals

Animal	Fecal Coliform Production Rate	Reference
Cattle	1.0×10^{11} counts/day	ASAE, 1998
Chickens	1.4×10^{8} counts/day	ASAE, 1998
Hogs	1.1×10^{10} counts/day	ASAE, 1998
Deer	5×10^{8} counts/day	Linear interpolation; Metcalf & Eddy, 1991

The estimated number of livestock animals in the Flint Creek watershed is discussed in Section 3.2.3. For modeling purposes, it was assumed that dairy cows are confined most of the time and that their waste is applied to pasture land. Beef cattle were assumed to have access to streams and were considered to be a direct nonpoint source of fecal coliform to the stream reaches. Chicken waste was assumed to be applied to pasture and hog waste was assumed to be applied to cropland.

Literature values for typical fecal coliform accumulation rates were used for the urban land uses. The literature value used for urban land uses is the median default value of 6.19 E+06 counts per acre per day for commercial land (Horner, 1992). The value used for barren and strip mining land uses was half of the urban value. The value used for fecal coliform accumulation rates on the harvested wood land use was the same value as forest.

The LSPC model is a build-up and wash-off model that represents the pollutant by accumulating the pollutant over time, storing the pollutant to some maximum limit, and then transporting the pollutant through overland flow to the stream. The model represents these processes with an accumulation rate (ACQOP) and the storage limit (SQOLIM). The FCLES tool calculates both of these values by using the livestock numbers and manure application rates, which come from literature values and the WCS data. WSQOP is defined as the rate of surface runoff (inches per hour) that results in 90 percent washoff in one hour. The lower the value, the more easily washoff occurs. This parameter is user-defined and was determined for each land use by EPA recommended ranges. The ACQOP and SQOLIM can be varied monthly or be a constant through the simulation. If specific data such as timing of manure applications, livestock rotations, and crop rotations are known, these rates can be calculated monthly. For the Flint Creek watershed modeling, the rates were input as constant values. There does not appear to be a clear rotation schedule of cattle and crops in the watershed. It was assumed that hog manure was applied to row crops year round.

Wildlife

Wildlife is another potential source of fecal coliform loading to receiving waterbodies. For modeling purposes, the deer population is assumed to represent the wildlife contribution, since population data for other wildlife species in the watershed was not readily available. It is assumed that deer habitat within the watershed includes forest, cropland, pasture, and wetlands. Typical estimates for the distribution of white-tailed deer within the region were provided by the Alabama Department of Conservation, Division of Wildlife and Freshwater Fisheries (2000). The provided density (deer per square mile) was applied to deer habitat areas within the

watershed to estimate population counts by subwatershed. The Flint Creek watershed typically has 15 or less deer per square mile. An average density of 7.5 deer per square mile was applied to forest, pasture, and cropland while a density of 15 deer per square mile was applied to wetland areas.

Cattle in the Stream

Cattle depositing manure directly into stream reaches represent a direct nonpoint source of fecal coliform. As stated earlier, it was assumed that only beef cattle have access to the stream reaches. It is assumed that dairy cows are mostly confined and that their waste is applied to pasture. The number of cattle producing and depositing fecal coliform in streams in the watershed at any give time were estimated. The percentage of cattle adjacent and non-adjacent to the stream reaches was determined for each subwatershed based on information provided in the *Flint Creek Watershed Project: Flint Creek Pollutant Loading Estimates* (Morgan County Soil and Water Conservation District 1995). It was assumed that 10 percent of the beef cattle have access to the stream, 3 percent are actually in the stream, and 1 percent of the cattle are depositing waste directly in the stream. The in-stream cattle numbers used in the LSPC model are presented in Appendix E. The cattle were simulated in the model as direct sources of fecal coliform loads, with a representative flow rate (cubic feet per second) and load (counts per hour). The representative load was calculated based on the number of cows in the stream and the fecal coliform production rate for cows (Table 4-3). The flow was estimated based on the number of cows in the stream, the manure production rate of cows (ASAE 1998) and the approximate density of cow manure.

Failing Septic Systems

Failing septic systems represent a nonpoint source that can contribute fecal coliform to receiving waterbodies through surface or subsurface malfunctions. The estimated number of septic systems and the pecent failure rate were provided by the SWCA Database (See Appendix B). To provide for a margin of safety accounting for the uncertainty of the number, location, and behavior (e.g., surface vs. subsurface breakouts; proximity to stream) of the failing systems, failing septic systems are represented in the model as direct sources of fecal coliform to the stream reaches. Fecal coliform contributions from failing septic system discharges are included in the model with a representative flow and concentration, which were quantified based on the following information:

- Number of failing septic systems in each subwatershed (Appendix B).
- Estimated population served by the septic systems (an average of 2.5 people per household, obtained from 2000 Bureau of the Census data).
- An average daily discharge of 70 gallons/person/day (Horsley & Witten 1996).
- Septic effluent concentration of 10^4 cfu per 100 milliliters (Horsley & Witten 1996).

4.2.2 Point Sources Representation

Permitted Point Sources

There are two permitted point sources in the Flint Creek watershed (Table 4-2). The point sources are permitted to discharge fecal coliform. These point sources are included in the model with a constant flow. The representative constant flow is the average flow provided in the Discharge Monitoring Report (DMR) data for each facility. The two point sources are not required to record their fecal coliform discharges, but based on their identification as municipal facilities, it is assumed that they do discharge fecal coliform. The facilities are represented in the LSPC model by a discharge of 200 fecal coliform counts per 100 milliliter. The facilities are assumed to meeting the Alabama NPDES permit limit of 200 counts per 100 milliliter and therefore most likely do not represent a significant source of fecal coliform to the watershed.

Table 4-2. Permitted point source facilities in the Flint Creek watershed

Facility Name	Receiving Waterbody	Permit Limit for Fecal Coliform	Average Flow (CFS)
Falkville HCR Lagoon	Flint Creek	200 counts/100 mL	2.00
Hartselle WWTP	Shoal Creek	200 counts/100 mL	3.24

4.3 Water Quality Calibration

Following hydrology calibration, the water quality constituents were calibrated. Modeled versus observed in-stream fecal coliform concentrations were directly compared during model calibration. The water quality calibration consisted of executing the watershed model, comparing water quality time series output to available water quality observation data, and adjusting water quality parameters within a reasonable range. The parameters that were adjusted to obtain a calibrated model were the build-up and washoff of fecal coliform from the land use coverages and the direct loads such as cattle in the streams and the failing septic systems as described in Section 4.2.1.

The approach taken to calibrate water quality focused on matching trends identified during the water quality analysis. Daily average in-stream fecal coliform concentrations from the model were compared directly to observed data. Observed fecal coliform data were obtained from ADEM for 1995 through 1997. The objective was to best simulate low flow, mean flow, and storm peaks at representative water quality monitoring stations. The model was calibrated at all water quality stations with fecal coliform observation data during the chosen calibration period. These stations were typically ADEM monitoring stations (See Figure 3-3).

The time period of the model simulation was from 1992 through 1998. This time period was selected based on the availability and relevance of the observed data to the current conditions in the watershed. The model was calibrated for the year 1997, which represented both high and low flow periods. For each water quality station, model results were plotted against the respective observed data to assess the model's response to spatial variation of loading sources. The results of the water quality calibrations for each of the listed pollutants are presented in Appendix F.

4.4 Critical Conditions

Data analysis shows that the critical condition for nonpoint source fecal coliform loading is an extended dry period followed by a rainfall runoff event. During the dry weather period, fecal coliform bacteria builds up on the land surface, and is washed off by rainfall. The critical condition for point and direct nonpoint source (municipal discharges, cattle in streams, and failing septic systems) loading occurs during periods of low stream flow when dilution is minimized. Both conditions are simulated in the water quality model. For the TMDL in Flint Creek, the water quality model was run for an 8-year period and covers a range of hydrological conditions that includes both low and high stream flows. The year of 1997 has been determined to be appropriate for critical conditions because it includes extended low flow periods followed by runoff events.

4.5 Margin of Safety (MOS)

There are two methods for incorporating a MOS in the analysis: a) by implicitly incorporating the MOS using conservative model assumptions to develop allocations; or b) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations. An implicit MOS was incorporated in this TMDL. An implicit MOS includes conservative modeling assumptions and a continuous simulation that incorporates a range of meteorological events. Conservative modeling assumptions used include: septic systems discharging directly into the streams, conservative estimates of in-stream decay, point sources discharging at permitted flows and the geometric mean for fecal coliform, and all land areas considered to be connected directly to streams. Fecal coliform decay (die-off) on the land surface is not computed in the model. Therefore, the fecal coliform rates and fecal coliform loads delivered to the model do not account for this decay and are a conservative load.

4.6 Seasonal Variation

Fecal coliform data analysis in the Flint Creek watershed shows that increased fecal coliform concentrations occur during both wet and dry weather periods with increased concentrations during high flows as well as low summer flows. To adequately address the wet and dry weather related problems, a long-term simulation covering a variety of hydrologic and rainfall conditions must be evaluated. The flow years of 1992 through 1998 were simulated and a critical period of 1997 was chosen to be the basis of the TMDL. By using continuous flow simulation (estimating flow over a period of several years), seasonal hydrologic and source loading was inherently considered.

5 TMDLs

This section presents the TMDLs developed for fecal coliform for the Flint Creek watershed (including Flint Creek, Shoal Creek, Cedar Creek, East Fork Flint Creek, Crowdabout Creek, No Business Creek, and West Flint Creek). The TMDLs are presented as counts/hour. Model output for 1997 was used to determine the TMDLs and allocation scenarios because the modeled water quality during 1997 represented critical conditions during the modeling period. There were additional years that represented critical conditions in the watershed, but were not chosen because of extreme weather conditions (i.e., tropical storms, El Niño, hurricanes, and droughts). The year 1997 was chosen to determine TMDLs and allocation scenarios because it was representative of more typical weather conditions, but still contained both wet and dry periods. Allocations were determined for 1997 and represented compliance with the 1,000 and 200 counts/100 milliliters as a geometric mean criteria.

A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality criteria, in this case Alabama's water quality criteria for aquatic life. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly of explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is denoted by the equation:

$$TMDL = WLAs + LAs + MOS$$

In order to develop TMDLs for waterbodies, the following approach was taken:

- Define TMDL endpoints
- Simulate baseline conditions
- Determine the TMDL and source allocations

5.1 TMDL Endpoints

TMDL endpoints represent the in-stream water quality targets used in quantifying TMDLs and their individual components. The geometric mean of 1,000 counts per 100 milliliters and the 200 counts per 100 milliliters geometric mean from June through September was selected as the TMDL endpoint for fecal coliform in the Flint Creek watershed. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

5.2 Baseline Conditions

The calibrated model provided the basis for performing the allocation analysis. The first step in the analysis involved simulation of baseline conditions. Baseline conditions represent existing nonpoint source loading conditions and permitted point source discharge conditions. The existing fecal coliform load for the listed segment is represented as the sum of the daily discharge load of the direct nonpoint sources (cattle in the streams and failing septic systems), the point sources loads, and the daily fecal coliform load indirectly going to surface waters from all land uses (e.g., surface runoff) for 1997. The baseline conditions allow for an evaluation of in-stream water quality under critical conditions.

The model was run for baseline conditions from January 1, 1992 through December 31, 1998. Predicted in-stream concentrations of fecal coliform for the listed waterbodies and their tributaries were compared directly to the TMDL endpoints. This comparison allowed evaluation of the expected magnitude and frequency of exceedance under a range of hydrologic and environmental conditions, including dry periods, wet periods, and more typical periods.

5.3 TMDLs and Source Allocations

A top-down methodology was followed to develop the TMDLs and allocate loads to sources. Impaired headwaters were first analyzed because their impact frequently had a profound effect n down-stream water quality. Loading contributions were reduced from applicable sources for these waterbodies and TMDLs were developed. Reductions were first made to direct nonpoint sources (in-stream cattle and failing septics). Any necessary remaining reductions were made to cropland and pastureland uses based on the large unit area loadings of fecal coliform from those specific land uses. Model results from the selected successful scenarios were then routed through down-stream waterbodies. Therefore, when TMDLs were developed for down-strream impaired waterbodies, up-stream contributions were representing conditions meeting water quality criteria. In some situations, reductions in sources impacting unimpaired headwaters were required in order to meet downstream water quality criteria.

5.4 Wasteload Allocations

Permitted facilities that exist in the watershed include two dischargers of fecal coliform. The two facilities are located on Shoal Creek (subwatershed 25) and Flint Creek (subwatershed 32). Since the two municipal facilities are assumed to be discharging at their permitted limits, it was assumed that they are not contributing to the fecal coliform impairment in the stream reaches, and therefore, are not considered to be major contributing sources. No reductions are necessary from point sources.

5.5 Load Allocations

Load allocations were made for the dominant source categories as follows:

- Washoff from agricultural land uses (cropland and pasture)
- Cattle in the stream reaches

- Failing septic systems

5.6 TMDL Results

The tables in Appendix G provide a summary of the existing loads of fecal coliform to each of the subwatersheds in the Flint Creek watershed, the TMDLs for each subwatershed, as well as the percent reduction from the contributing sources needed to meet the geometric mean criteria for fecal coliform.

6 TMDL Implementation

6.1 Non-Point Source Approach

The Flint Creek watershed is impaired by nonpoint sources from land use runoff, failing septic systems, and cattle in the streams. For 303(d) listed waters impaired solely or primarily by nonpoint source (NPS) pollutants, necessary reductions will be sought during TMDL implementation using a phased approach. Voluntary, incentive-based mechanisms will be used to implement NPS management measures in order to assure that measurable reductions in pollutant loadings can be achieved for the targeted impaired water. Cooperation and active participation by the general public and various industry, business, and environmental groups is critical to successful implementation of TMDLs. Local citizen-led and implemented management measures offer the most efficient and comprehensive avenue for reduction of loading rates from nonpoint sources. Therefore, TMDL implementation activities will be coordinated through interaction with local entities in conjunction with Clean Water Partnership efforts.

The primary TMDL implementation mechanism used will employ concurrent education and outreach, training, technology transfer, and technical assistance with incentive-based pollutant management measures. The ADEM Office of Education and Outreach (OEO) will assist in the implementation of TMDLs in cooperation with public and private stakeholders. Planning and oversight will be provided by or coordinated with the Alabama Department of Environmental Management's (ADEM) Section 319 nonpoint source grant program in conjunction with other local, state, and federal resource management and protection programs and authorities. The CWA Section 319 grant program may provide limited funding to specifically ascertain NPS pollution sources and causes, identify and coordinate management programs and resources, present education and outreach opportunities, promote pollution prevention, and implement needed management measures to restore impaired waters.

Depending on the pollutant of concern, resources for corrective actions may be provided, as applicable, by the Alabama Cooperative Extension System (education and outreach); the USDA-Natural Resources Conservation Service (NRCS) (technical assistance) and Farm Services Agency (FSA) (federal cost-share funding); and the Alabama Soil and Water Conservation Committee (state agricultural cost share funding and management measure implementation assistance) through local Soil and Water Conservation Districts, or Resource Conservation and Development Councils (funding, project implementation, and coordination). Additional assistance from such agencies as the Alabama Department of Public Health (septic systems), Alabama Department of Agriculture and Industries, and the Alabama Department of Industrial Relations and Dept of Interior - Office of Surface Mining (abandoned minelands), Natural Heritage Program and US Fish and Wildlife Service (threatened and endangered species), may also provide practical TMDL implementation delivery systems, programs, and information. Land use and urban sprawl issues will be addressed through the Nonpoint Education Source for Municipal Officials (NEMO) outreach program. Memorandums of Agreement (MOAs) may be used as a tool to formally define roles and responsibilities.

Additional public/private assistance is available through the Alabama Clean Water Partnership Program (CWP). The CWP program uses a local citizen-based environmental protection approach to coordinate efforts to restore and protect the state's resources in accordance with the goals of the Clean Water Act. Interaction with the state or river basin specific CWP will facilitate TMDL implementation by providing improved and timely communication and information exchange between community-based groups, units of government, industry, special interest groups, and individuals. The CWP can assist local entities to plan, develop, and coordinate restoration strategies that holistically meet multiple needs, eliminate duplication of efforts, and allow for effective and efficient use of available resources to restore the impaired waterbody or watershed.

Other mechanisms that are available and may be used during implementation of this TMDL include local regulations or ordinances related to zoning, land use, or storm water runoff controls. Local governments can provide funding assistance through general revenues, bond issuance, special taxes, utility fees, and impact fees. If applicable, reductions from point sources will be addressed by the NPDES permit program. The Alabama Water Pollution Control Act empowers ADEM to monitor water quality, issue permits, conduct inspections, and pursue enforcement of discharge activities and conditions that threaten water quality. In addition to traditional "end-of-pipe" discharges, the ADEM NPDES permit program addresses animal feeding operations and land application of animal wastes. For certain water quality improvement projects, the State Clean Water Revolving Fund (SRF) can provide low interest loans to local governments.

Long-term physical, chemical, and biological improvements in water quality will be used to measure TMDL implementation success. As may be indicated by further evaluation of stream water quality, the effectiveness of implemented management measures may necessitate revisions of this TMDL. The ADEM will continue to monitor water quality according to the rotational river basin monitoring schedule as allowed by resources. In addition, assessments may include local citizen-volunteer monitoring through the Alabama Water Watch Program and/or data collected by agencies, universities, or other entities using standardized monitoring and assessment methodologies. Core management measures will include, but not be limited to water quality improvements and designated use support, preserving and enhancing public health, enhancing ecosystems, pollution prevention and load reductions, implementation of NPS controls, and public awareness and attitude/behavior changes.

6.2 Point Source Approach

Point source reductions are not necessary to meet the TMDLs for the Flint Creek watershed.

7 Follow Up Monitoring

ADEM has adopted a basin approach to water quality management; an approach that divides Alabama's fourteen major river basins into five groups. Each year, the ADEM water quality resources are concentrated in one of the basin groups. One goal is to continue to monitor §303(d) listed waters. This monitoring will occur in each basin according to the schedule in Table 7-1. The Flint Creek watershed is located in the Tennessee River basin.

Table 7-1. Monitoring schedule for Alabama river basins

River Basin Group	Scheduled Year
Cahaba / Black Warrior	2002
Tennessee	2003
Choctawhatchee / Chipola / Perdido-Escambia / Chattahoochee	2004
Tallapoosa / Alabama / Coosa	2005
Escatawpa / Upper Tombigbee / Lower Tombigbee / Mobile	2006

Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices in the watershed.

8 Public Participation

A thirty-day public notice will be provided for this TMDL. During this time, copies of this TMDL will be available upon request, and the public will be invited to provide comments on the TMDL.

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Appendix A

Livestock Counts by Subwatershed in the Flint Creek Basin

Table A-1. Livestock counts by subwatershed in the Flint Creek basin

Subbasin	Name	Beef Cows	Dairy Cows	Hogs	Chickens
1	Embayment DR	34	2	1	2118
2	Embayment DR	459	38	23	34682
3	Embayment DR	6	1	0	650
4	Hickory Hills	298	37	22	33834
5	Embayment Comp	948	99	60	89726
6	Village Branch	48	3	2	2937
7	Village Branch	615	57	34	51429
8	Embayment DR	6	1	0	706
9	Lower Flint Creek DR	488	37	22	33072
10	Lower Flint Creek DR	48	3	2	2937
11	No Buisiness Creek	2538	207	124	187472
12	No Buisiness Creek	1834	185	111	166912
13	Lower Flint Creek DR	476	41	25	37477
14	Crowdabout Creek	1406	235	47	132424
15	Crowdabout Creek	228	43	9	24234
16	Crowdabout Creek	996	152	30	85645
17	Crowdabout Creek	0	0	0	77
18	Crowdabout Creek	1048	168	34	95055
19	Crowdabout Creek	2471	402	80	227210
20	Lower Flint Creek DR	1030	7	6	76354
21	Lower Flint Creek DR	37	39	31	412587
22	Mack Creek	572	55	44	584613
23	Lower Flint Creek DR	1049	2	1	18399
24	Lower Flint Creek DR	1318	26	21	276898
25	Shoal Creek	0	10	8	110391
26	Shoal Creek	3372	3	2	30358
27	Shoal Creek	153	59	47	633370
28	Middle Flint Creek DR	1047	0	0	0
29	Cedar Creek	1455	134	107	1431866
30	Middle Flint Creek DR	780	0	0	0
31	Middle Flint Creek DR	2	35	28	378090
32	Middle Flint Creek DR	386	14	12	153398
33	Robinson Creek	0	54	43	577944
34	Middle Flint Creek DR	521	0	0	460
35	Middle Flint Creek DR	2	28	23	303116
36	Mike Creek	101	41	33	434665
37	Indian Creek	1557	22	17	229982
38	Uppper Flint Creek DR	1023	0	0	460
39	Mill Creek	908	61	49	655678
40	Uppper Flint Creek DR	1673	4	4	47146

Subbasin	Name	Beef Cows	Dairy Cows	Hogs	Chickens
41	Rock Creek	51	34	27	363371
42	Lick Creek	1125	75	60	797576
43	East Fork Creek	138	45	36	484111
44	West Flint Creek DR	390	32	19	28496
45	West Flint Creek DR	858	66	40	59817
46	Mud Tavern Creek	879	79	47	71481
47	West Flint Creek DR	1364	111	67	100853
48	Flat Creek	617	15	61	1018
49	West Flint Creek DR	23	0	2	28
50	Big Shoal Creek	1529	30	121	2021
51	West Flint Creek DR	159	3	12	203
52	McDaniel Creek	949	20	81	1353
53	West Flint Creek DR	363	7	29	478
54	West Flint Creek DR	1365	32	126	2111
55	Elam Creek	248	6	24	404
56	Elam Creek	463	11	42	707
57	Elam Creek	891	22	87	1455
58	Elam Creek	234	4	16	266

Appendix B

Septic System Counts in the Flint Creek Watershed

Table B-1. Septic system numbers and failure rates in the Flint Creek watershed

Subbasin	Name	Number of Septic Systems	Percent Failing
1	Embayment DR	27	6
2	Embayment DR	369	6
3	Embayment DR	5	6
4	Hickory Hills	239	6
5	Embayment Comp	761	6
6	Village Branch	38	6
7	Village Branch	494	6
8	Embayment DR	5	6
9	Lower Flint Creek DR	392	6
10	Lower Flint Creek DR	38	6
11	No Buisiness Creek	2038	6
12	No Buisiness Creek	1473	6
13	Lower Flint Creek DR	382	6
14	Crowdabout Creek	2172	9
15	Crowdabout Creek	351	9
16	Crowdabout Creek	1538	9
17	Crowdabout Creek	0	9
18	Crowdabout Creek	1619	9

Subbasin	Name	Number of Septic Systems	Percent Failing
19	Crowdabout Creek	3816	9
20	Lower Flint Creek DR	49	5
21	Lower Flint Creek DR	335	5
22	Mack Creek	421	5
23	Lower Flint Creek DR	12	5
24	Lower Flint Creek DR	183	5
25	Shoal Creek	44	5
26	Shoal Creek	16	5
27	Shoal Creek	359	5
28	Middle Flint Creek DR	0	5
29	Cedar Creek	1078	5
30	Middle Flint Creek DR	0	5
31	Middle Flint Creek DR	329	5
32	Middle Flint Creek DR	123	5
33	Robinson Creek	465	5
34	Middle Flint Creek DR	1	5
35	Middle Flint Creek DR	249	5
36	Mike Creek	335	5
37	Indian Creek	166	5
38	Uppper Flint Creek DR	1	5
39	Mill Creek	498	5
40	Uppper Flint Creek DR	32	5
41	Rock Creek	290	5
42	Lick Creek	535	5
43	East Fork Creek	327	5
44	West Flint Creek DR	313	6
45	West Flint Creek DR	689	6
46	Mud Tavern Creek	706	6
47	West Flint Creek DR	1096	6
48	Flat Creek	224	90
49	West Flint Creek DR	8	90
50	Big Shoal Creek	554	90
51	West Flint Creek DR	57	90
52	McDaniel Creek	344	90
53	West Flint Creek DR	131	90
54	West Flint Creek DR	494	90
55	Elam Creek	90	90
56	Elam Creek	168	90
57	Elam Creek	323	90
58	Elam Creek	85	90

Appendix C

1.1 Flow and Fecal Coliform Data in the Flint Creek Watershed

Table C-1. Flow data in the Flint Creek watershed

Stream Name	Station	Date	Flow (cfs)
Big Shoal Creek	Site 14	12/3/96	22
Big Shoal Creek	Site 14	1/7/97	31.8
Big Shoal Creek	Site 14	2/4/97	42
Big Shoal Creek	Site 14	3/5/97	53.1
Big Shoal Creek	Site 14	4/2/97	6.6
Big Shoal Creek	Site 14	5/6/97	14.3
Big Shoal Creek	Site 14	6/4/97	19.5
Big Shoal Creek	Site 14	7/15/97	2.8
Big Shoal Creek	Site 14	8/5/97	0.36
Big Shoal Creek	Site 14	9/3/97	0.7
Big Shoal Creek	Site 14	10/2/97	0.9
Big Shoal Creek	Site 14	11/4/97	8.7
Big Shoal Creek	Site 14	12/2/97	11
Cedar Creek	Site 13	6/1/95	10.0
Cedar Creek	Site 13	11/14/95	45.1
Cedar Creek	Site 13	5/28/96	2.8
Cedar Creek	Site 13	11/25/96	17.9
Cedar Creek	Site 13	3/19/97	124
Cedar Creek	Site 13	12/4/97	48.3
Crowdabout Creek	Site 10-A	1/12/95	200
Crowdabout Creek	Site 10-A	2/7/95	26
Crowdabout Creek	Site 10-A	3/14/95	80
Crowdabout Creek	Site 10-A	4/11/95	8
Crowdabout Creek	Site 10-A	4/12/95	3
Crowdabout Creek	Site 10-A	5/2/95	63
Crowdabout Creek	Site 10-A	6/8/95	1
Crowdabout Creek	Site 10-A	7/18/95	2
Crowdabout Creek	Site 10-A	8/8/95	7
Crowdabout Creek	Site 10-A	9/6/95	0
Crowdabout Creek	Site 10-A	10/3/95	40
Crowdabout Creek	Site 10-A	10/11/95	8
Crowdabout Creek	Site 10-A	11/14/95	124
Crowdabout Creek	Site 10-A	12/4/95	120
Crowdabout Creek	Site 10-A	1/9/96	194
Crowdabout Creek	Site 10-A	2/6/96	50
Crowdabout Creek	Site 10-A	3/5/96	15
Crowdabout Creek	Site 10-A	3/19/96	360
Crowdabout Creek	Site 10-A	4/8/96	13
Crowdabout Creek	Site 10-A	5/6/96	7
Crowdabout Creek	Site 10-A	6/4/96	5
Crowdabout Creek	Site 10-A	7/1/96	1
Crowdabout Creek	Site 10-A	8/5/96	7
Crowdabout Creek	Site 10-A	9/3/96	4
Crowdabout Creek	Site 10-A	9/17/96	68
Crowdabout Creek	Site 10-A	10/1/96	1
Crowdabout Creek	Site 10-A	11/4/96	12
Crowdabout Creek	Site 10-A	12/2/96	300
Crowdabout Creek	Site 10-A	1/6/97	120
Crowdabout Creek	Site 10-A	2/3/97	53
Crowdabout Creek	Site 10-A	2/27/97	384
Crowdabout Creek	Site 10-A	3/3/97	910
Crowdabout Creek	Site 10-A	4/1/97	18

Stream Name	Station	Date	Flow (cfs)
Crowdabout Creek	Site 10-A	5/5/97	180
Crowdabout Creek	Site 10-A	6/3/97	47
Crowdabout Creek	Site 10-A	7/14/97	6
Crowdabout Creek	Site 10-A	8/4/97	1
Crowdabout Creek	Site 10-A	9/2/97	0.5
Crowdabout Creek	Site 10-A	10/1/97	4
Crowdabout Creek	Site 10-A	11/3/97	42
Crowdabout Creek	Site 10-A	11/6/97	23
Crowdabout Creek	Site 10-A	12/1/97	30
Flint Creek	Site 1	1/12/95	1,250
Flint Creek	Site 1	2/7/95	370
Flint Creek	Site 1	3/14/95	940
Flint Creek	Site 1	4/11/95	87
Flint Creek	Site 1	5/2/95	725
Flint Creek	Site 1	6/7/95	300
Flint Creek	Site 1	7/18/95	28
Flint Creek	Site 1	8/8/95	290
Flint Creek	Site 1	9/6/95	2.2
Flint Creek	Site 1	10/11/95	220
Flint Creek	Site 1	11/14/95	1,630
Flint Creek	Site 1	12/5/95	730
Flint Creek	Site 1	1/9/96	3,550
Flint Creek	Site 1	2/6/96	895
Flint Creek	Site 1	3/5/96	400
Flint Creek	Site 1	4/9/96	560
Flint Creek	Site 1	5/7/96	360
Flint Creek	Site 1	6/5/96	55
Flint Creek	Site 1	7/2/96	20
Flint Creek	Site 1	8/6/96	210
Flint Creek	Site 1	9/4/96	910
Flint Creek	Site 1	10/2/96	290
Flint Creek	Site 1	11/5/96	390
Flint Creek	Site 1	12/3/96	2,600
Flint Creek	Site 1	1/7/97	1,510
Flint Creek	Site 1	2/4/97	1,390
Flint Creek	Site 1	3/4/97	4,060
Flint Creek	Site 1	4/2/97	330
Flint Creek	Site 1	5/6/97	4,300
Flint Creek	Site 1	6/4/97	1,230
Flint Creek	Site 1	7/15/97	150
Flint Creek	Site 1	8/5/97	46
Flint Creek	Site 1	9/3/97	12
Flint Creek	Site 1	10/2/97	64
Flint Creek	Site 1	11/4/97	420
Flint Creek	Site 1	12/2/97	370
Flint Creek	Site 2	1/12/95	1,140
Flint Creek	Site 2	2/7/95	333
Flint Creek	Site 2	3/14/95	854
Flint Creek	Site 2	4/11/95	79
Flint Creek	Site 2	5/2/95	658
Flint Creek	Site 2	6/7/95	275
Flint Creek	Site 2	7/18/95	25

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 2	8/8/95	260
Flint Creek	Site 2	9/6/95	2
Flint Creek	Site 2	10/11/95	200
Flint Creek	Site 2	11/14/95	1,480
Flint Creek	Site 2	12/5/95	661
Flint Creek	Site 2	1/9/96	3,230
Flint Creek	Site 2	2/6/96	814
Flint Creek	Site 2	3/5/96	364
Flint Creek	Site 2	4/9/96	510
Flint Creek	Site 2	5/7/96	325
Flint Creek	Site 2	6/5/96	50
Flint Creek	Site 2	7/2/96	18
Flint Creek	Site 2	8/6/96	190
Flint Creek	Site 2	9/4/96	828
Flint Creek	Site 2	10/2/96	260
Flint Creek	Site 2	11/5/96	357
Flint Creek	Site 2	12/3/96	2,390
Flint Creek	Site 2	1/7/97	1,370
Flint Creek	Site 2	2/4/97	1,260
Flint Creek	Site 2	3/4/97	3,690
Flint Creek	Site 2	4/2/97	300
Flint Creek	Site 2	5/6/97	3,920
Flint Creek	Site 2	6/4/97	1,120
Flint Creek	Site 2	7/15/97	136
Flint Creek	Site 2	8/5/97	42
Flint Creek	Site 2	9/3/97	10
Flint Creek	Site 2	10/2/97	58
Flint Creek	Site 2	11/4/97	380
Flint Creek	Site 2	12/2/97	340
Flint Creek	Site 3	1/11/95	188
Flint Creek	Site 3	2/7/95	140
Flint Creek	Site 3	3/14/95	376
Flint Creek	Site 3	4/11/95	44
Flint Creek	Site 3	5/1/95	206
Flint Creek	Site 3	6/6/95	21
Flint Creek	Site 3	7/17/95	0.02
Flint Creek	Site 3	8/8/95	240
Flint Creek	Site 3	9/5/95	1.6
Flint Creek	Site 3	10/11/95	112
Flint Creek	Site 3	11/14/95	649
Flint Creek	Site 3	12/5/95	397
Flint Creek	Site 3	1/9/96	1,530
Flint Creek	Site 3	2/6/96	295
Flint Creek	Site 3	3/5/96	123
Flint Creek	Site 3	4/9/96	207
Flint Creek	Site 3	5/7/96	98
Flint Creek	Site 3	6/5/96	26
Flint Creek	Site 3	7/2/96	5.1
Flint Creek	Site 3	8/6/96	131
Flint Creek	Site 3	9/4/96	21
Flint Creek	Site 3	10/2/96	41
Flint Creek	Site 3	11/5/96	94

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 3	12/3/96	1,860
Flint Creek	Site 3	1/7/97	580
Flint Creek	Site 3	2/4/97	560
Flint Creek	Site 3	3/4/97	2,470
Flint Creek	Site 3	4/2/97	93
Flint Creek	Site 3	5/6/97	3,390
Flint Creek	Site 3	6/3/97	577
Flint Creek	Site 3	7/15/97	74
Flint Creek	Site 3	8/5/97	20
Flint Creek	Site 3	9/3/97	7
Flint Creek	Site 3	10/1/97	40
Flint Creek	Site 3	11/4/97	220
Flint Creek	Site 3	12/2/97	180
Flint Creek	Site 4	1/11/95	184
Flint Creek	Site 4	2/7/95	136
Flint Creek	Site 4	3/14/95	370
Flint Creek	Site 4	4/11/95	43.4
Flint Creek	Site 4	4/12/95	17
Flint Creek	Site 4	5/1/95	202
Flint Creek	Site 4	6/6/95	21
Flint Creek	Site 4	7/17/95	11
Flint Creek	Site 4	8/8/95	235
Flint Creek	Site 4	9/5/95	1.6
Flint Creek	Site 4	10/3/95	210
Flint Creek	Site 4	10/11/95	110
Flint Creek	Site 4	11/14/95	636
Flint Creek	Site 4	12/5/95	389
Flint Creek	Site 4	1/9/96	1,510
Flint Creek	Site 4	2/6/96	292
Flint Creek	Site 4	3/5/96	122
Flint Creek	Site 4	3/19/96	562
Flint Creek	Site 4	4/9/96	205
Flint Creek	Site 4	5/7/96	97.1
Flint Creek	Site 4	6/5/96	26
Flint Creek	Site 4	7/2/96	5
Flint Creek	Site 4	8/6/96	130
Flint Creek	Site 4	9/4/96	20
Flint Creek	Site 4	9/17/96	460
Flint Creek	Site 4	10/2/96	40.4
Flint Creek	Site 4	11/5/96	93.3
Flint Creek	Site 4	12/3/96	1,840
Flint Creek	Site 4	1/7/97	573
Flint Creek	Site 4	2/4/97	552
Flint Creek	Site 4	2/27/97	582
Flint Creek	Site 4	3/4/97	2,450
Flint Creek	Site 4	4/2/97	92
Flint Creek	Site 4	5/6/97	3,360
Flint Creek	Site 4	6/3/97	571
Flint Creek	Site 4	7/15/97	73
Flint Creek	Site 4	8/5/97	20
Flint Creek	Site 4	9/3/97	7
Flint Creek	Site 4	10/1/97	39

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 4	11/4/97	218
Flint Creek	Site 4	11/6/97	160
Flint Creek	Site 4	12/2/97	179
Flint Creek	Site 5	1/11/95	196
Flint Creek	Site 5	2/6/95	120
Flint Creek	Site 5	3/13/95	343
Flint Creek	Site 5	4/10/95	39
Flint Creek	Site 5	5/1/95	170
Flint Creek	Site 5	5/2/95	200
Flint Creek	Site 5	6/6/95	16
Flint Creek	Site 5	7/17/95	8.2
Flint Creek	Site 5	8/7/95	142
Flint Creek	Site 5	9/5/95	1.2
Flint Creek	Site 5	10/10/95	84
Flint Creek	Site 5	11/2/95	242
Flint Creek	Site 5	11/13/95	580
Flint Creek	Site 5	12/4/95	290
Flint Creek	Site 5	1/8/96	1,310
Flint Creek	Site 5	2/5/96	320
Flint Creek	Site 5	3/4/96	96
Flint Creek	Site 5	4/8/96	160
Flint Creek	Site 5	4/23/96	2,300
Flint Creek	Site 5	5/6/96	81
Flint Creek	Site 5	6/4/96	19
Flint Creek	Site 5	7/1/96	4
Flint Creek	Site 5	8/5/96	99
Flint Creek	Site 5	9/3/96	15
Flint Creek	Site 5	10/1/96	42
Flint Creek	Site 5	11/4/96	76
Flint Creek	Site 5	11/18/96	170
Flint Creek	Site 5	12/2/96	1,240
Flint Creek	Site 5	1/6/97	460
Flint Creek	Site 5	2/3/97	370
Flint Creek	Site 5	3/3/97	1,950
Flint Creek	Site 5	3/5/97	1,340
Flint Creek	Site 5	4/1/97	96
Flint Creek	Site 5	5/5/97	1,470
Flint Creek	Site 5	6/3/97	440
Flint Creek	Site 5	7/14/97	54
Flint Creek	Site 5	8/4/97	15
Flint Creek	Site 5	9/2/97	7
Flint Creek	Site 5	10/1/97	29
Flint Creek	Site 5	11/3/97	160
Flint Creek	Site 5	11/13/97	170
Flint Creek	Site 5	12/1/97	120
Flint Creek	Site 6	1/11/95	177
Flint Creek	Site 6	2/6/95	107
Flint Creek	Site 6	3/13/95	309
Flint Creek	Site 6	4/10/95	35.3
Flint Creek	Site 6	5/1/95	153
Flint Creek	Site 6	6/6/95	14.1
Flint Creek	Site 6	7/17/95	7.4

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 6	8/7/95	128
Flint Creek	Site 6	9/5/95	1.1
Flint Creek	Site 6	10/10/95	76
Flint Creek	Site 6	11/13/95	525
Flint Creek	Site 6	12/4/95	262
Flint Creek	Site 6	1/8/96	1,180
Flint Creek	Site 6	2/5/96	288
Flint Creek	Site 6	3/4/96	86.6
Flint Creek	Site 6	4/8/96	142
Flint Creek	Site 6	5/6/96	72.8
Flint Creek	Site 6	6/4/96	17.4
Flint Creek	Site 6	7/1/96	3.37
Flint Creek	Site 6	8/5/96	89.3
Flint Creek	Site 6	9/3/96	13.7
Flint Creek	Site 6	10/1/96	38
Flint Creek	Site 6	11/4/96	68.5
Flint Creek	Site 6	12/2/96	1,120
Flint Creek	Site 6	1/6/97	418
Flint Creek	Site 6	2/3/97	336
Flint Creek	Site 6	3/3/97	1,760
Flint Creek	Site 6	4/1/97	87
Flint Creek	Site 6	5/5/97	1,320
Flint Creek	Site 6	6/3/97	396
Flint Creek	Site 6	7/14/97	49
Flint Creek	Site 6	8/4/97	13
Flint Creek	Site 6	9/2/97	6
Flint Creek	Site 6	10/1/97	26
Flint Creek	Site 6	11/3/97	146
Flint Creek	Site 6	12/1/97	111
Flint Creek	Site 7	1/11/95	114
Flint Creek	Site 7	2/6/95	69
Flint Creek	Site 7	2/27/95	258
Flint Creek	Site 7	3/13/95	215
Flint Creek	Site 7	4/10/95	22
Flint Creek	Site 7	5/1/95	82
Flint Creek	Site 7	6/6/95	6
Flint Creek	Site 7	6/7/95	76
Flint Creek	Site 7	7/17/95	3.8
Flint Creek	Site 7	8/7/95	50
Flint Creek	Site 7	9/5/95	0
Flint Creek	Site 7	10/10/95	68
Flint Creek	Site 7	11/13/95	330
Flint Creek	Site 7	12/4/95	185
Flint Creek	Site 7	1/8/96	720
Flint Creek	Site 7	2/5/96	185
Flint Creek	Site 7	3/4/96	45
Flint Creek	Site 7	3/6/96	520
Flint Creek	Site 7	4/8/96	105
Flint Creek	Site 7	5/6/96	54
Flint Creek	Site 7	6/4/96	10
Flint Creek	Site 7	7/1/96	0.3
Flint Creek	Site 7	7/8/96	190

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 7	8/5/96	60
Flint Creek	Site 7	9/3/96	3
Flint Creek	Site 7	10/1/96	18
Flint Creek	Site 7	11/4/96	48
Flint Creek	Site 7	12/2/96	550
Flint Creek	Site 7	1/6/97	200
Flint Creek	Site 7	1/16/97	500
Flint Creek	Site 7	2/3/97	180
Flint Creek	Site 7	3/3/97	1,500
Flint Creek	Site 7	4/1/97	41
Flint Creek	Site 7	5/5/97	800
Flint Creek	Site 7	6/3/97	250
Flint Creek	Site 7	7/1/97	550
Flint Creek	Site 7	7/14/97	36
Flint Creek	Site 7	8/4/97	6
Flint Creek	Site 7	9/2/97	1
Flint Creek	Site 7	10/1/97	9
Flint Creek	Site 7	11/3/97	90
Flint Creek	Site 7	12/1/97	90
Flint Creek	Site 8	1/10/95	9.9
Flint Creek	Site 8	2/6/95	8.8
Flint Creek	Site 8	3/13/95	47.6
Flint Creek	Site 8	4/10/95	3.2
Flint Creek	Site 8	5/1/95	9.8
Flint Creek	Site 8	6/6/95	0.5
Flint Creek	Site 8	7/17/95	0.1
Flint Creek	Site 8	8/7/95	4.5
Flint Creek	Site 8	9/5/95	0.0
Flint Creek	Site 8	10/10/95	7.8
Flint Creek	Site 8	11/13/95	32.1
Flint Creek	Site 8	12/4/95	27
Flint Creek	Site 8	1/8/96	47.8
Flint Creek	Site 8	2/7/96	18.9
Flint Creek	Site 8	3/4/96	7.2
Flint Creek	Site 8	4/8/96	13.1
Flint Creek	Site 8	5/6/96	6.4
Flint Creek	Site 8	6/4/96	1.4
Flint Creek	Site 8	7/1/96	0.1
Flint Creek	Site 8	8/5/96	8.5
Flint Creek	Site 8	9/3/96	0.7
Flint Creek	Site 8	10/1/96	2.0
Flint Creek	Site 8	11/4/96	4.0
Flint Creek	Site 8	12/2/96	23.1
Flint Creek	Site 8	1/6/97	21.4
Flint Creek	Site 8	2/3/97	29.8
Flint Creek	Site 8	3/3/97	222.0
Flint Creek	Site 8	4/1/97	6.0
Flint Creek	Site 8	5/5/97	43.9
Flint Creek	Site 8	6/3/97	15.4
Flint Creek	Site 8	7/14/97	2.8
Flint Creek	Site 8	8/4/97	0.8
Flint Creek	Site 8	9/2/97	0.4

Stream Name	Station	Date	Flow (cfs)
Flint Creek	Site 8	10/1/97	580.0
Flint Creek	Site 8	11/3/97	13.1
Flint Creek	Site 8	12/1/97	11.7
No Business Creek	Site 11	5/2/95	82
No Business Creek	Site 11	11/2/95	75.4
No Business Creek	Site 11	4/23/96	550
No Business Creek	Site 11	11/18/96	210
No Business Creek	Site 11	3/3/97	2,320
No Business Creek	Site 11	11/13/97	16.2
Shoal Creek	Site 12	6/1/95	21.1
Shoal Creek	Site 12	11/14/95	24.2
Shoal Creek	Site 12	5/28/96	10.8
Shoal Creek	Site 12	11/25/96	80.8
Shoal Creek	Site 12	3/19/97	105
Shoal Creek	Site 12	12/4/97	30.5
West Flint Creek	Site 9-A	1/12/95	405
West Flint Creek	Site 9-A	2/7/95	97
West Flint Creek	Site 9-A	2/27/95	185
West Flint Creek	Site 9-A	3/14/95	360
West Flint Creek	Site 9-A	4/11/95	24
West Flint Creek	Site 9-A	5/2/95	237
West Flint Creek	Site 9-A	6/7/95	26
West Flint Creek	Site 9-A	6/8/95	59
West Flint Creek	Site 9-A	7/18/95	11
West Flint Creek	Site 9-A	8/8/95	18
West Flint Creek	Site 9-A	9/6/95	0
West Flint Creek	Site 9-A	10/11/95	53
West Flint Creek	Site 9-A	11/14/95	510
West Flint Creek	Site 9-A	12/5/95	207
West Flint Creek	Site 9-A	1/9/96	1,082
West Flint Creek	Site 9-A	2/6/96	277
West Flint Creek	Site 9-A	3/5/96	156
West Flint Creek	Site 9-A	3/6/96	1,300
West Flint Creek	Site 9-A	4/9/96	151
West Flint Creek	Site 9-A	5/7/96	61
West Flint Creek	Site 9-A	6/5/96	17
West Flint Creek	Site 9-A	7/2/96	12
West Flint Creek	Site 9-A	7/8/96	31
West Flint Creek	Site 9-A	8/6/96	26
West Flint Creek	Site 9-A	9/4/96	812
West Flint Creek	Site 9-A	10/2/96	197
West Flint Creek	Site 9-A	11/5/96	232
West Flint Creek	Site 9-A	12/3/96	615
West Flint Creek	Site 9-A	1/7/97	510
West Flint Creek	Site 9-A	1/16/97	980
West Flint Creek	Site 9-A	2/4/97	703
West Flint Creek	Site 9-A	3/4/97	2,860
West Flint Creek	Site 9-A	4/2/97	105
West Flint Creek	Site 9-A	5/6/97	1,030
West Flint Creek	Site 9-A	6/4/97	530
West Flint Creek	Site 9-A	7/1/97	1,320
West Flint Creek	Site 9-A	7/15/97	44

Stream Name	Station	Date	Flow (cfs)
West Flint Creek	Site 9-A	8/5/97	17
West Flint Creek	Site 9-A	9/3/97	2
West Flint Creek	Site 9-A	10/2/97	10
West Flint Creek	Site 9-A	11/4/97	107
West Flint Creek	Site 9-A	12/2/97	110

Table C-2. Fecal coliform data in the Flint Creek watershed used in TMDL development

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Big Shoal Creek	Site 14	4/11/95	310
Big Shoal Creek	Site 14	5/3/95	1,030
Big Shoal Creek	Site 14	6/7/95	6,300
Big Shoal Creek	Site 14	7/18/95	117
Big Shoal Creek	Site 14	8/8/95	330
Big Shoal Creek	Site 14	9/6/95	37
Big Shoal Creek	Site 14	10/11/95	780
Big Shoal Creek	Site 14	11/15/95	320
Big Shoal Creek	Site 14	12/6/95	166
Big Shoal Creek	Site 14	1/9/96	380
Big Shoal Creek	Site 14	2/7/96	97
Big Shoal Creek	Site 14	3/5/96	330
Big Shoal Creek	Site 14	4/9/96	90
Big Shoal Creek	Site 14	5/7/96	250
Big Shoal Creek	Site 14	6/5/96	420
Big Shoal Creek	Site 14	7/2/96	310
Big Shoal Creek	Site 14	8/6/96	250
Big Shoal Creek	Site 14	9/4/96	33,000
Big Shoal Creek	Site 14	10/2/96	2,200
Big Shoal Creek	Site 14	11/5/96	113
Big Shoal Creek	Site 14	12/3/96	140
Big Shoal Creek	Site 14	1/7/97	560
Big Shoal Creek	Site 14	2/4/97	740
Big Shoal Creek	Site 14	3/5/97	200
Big Shoal Creek	Site 14	4/2/97	77
Big Shoal Creek	Site 14	5/6/97	520
Big Shoal Creek	Site 14	6/4/97	240
Big Shoal Creek	Site 14	7/15/97	166
Big Shoal Creek	Site 14	8/5/97	17
Big Shoal Creek	Site 14	9/3/97	90
Big Shoal Creek	Site 14	10/2/97	190
Big Shoal Creek	Site 14	11/4/97	110
Big Shoal Creek	Site 14	12/2/97	200
Cedar Creek	Site 13	6/1/95	34,000
Cedar Creek	Site 13	11/14/95	470
Cedar Creek	Site 13	5/28/96	4,700
Cedar Creek	Site 13	11/25/96	2,600
Cedar Creek	Site 13	3/19/97	5,900
Cedar Creek	Site 13	12/4/97	2,400
Crowdabout Creek	Site 10-A	1/12/95	3,700
Crowdabout Creek	Site 10-A	2/7/95	120

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Crowdabout Creek	Site 10-A	3/14/95	260
Crowdabout Creek	Site 10-A	4/11/95	260
Crowdabout Creek	Site 10-A	4/12/95	2,000
Crowdabout Creek	Site 10-A	5/2/95	4,700
Crowdabout Creek	Site 10-A	6/8/95	2,700
Crowdabout Creek	Site 10-A	7/18/95	800
Crowdabout Creek	Site 10-A	8/8/95	113
Crowdabout Creek	Site 10-A	9/6/95	113
Crowdabout Creek	Site 10-A	10/3/95	7,400
Crowdabout Creek	Site 10-A	10/11/95	2,000
Crowdabout Creek	Site 10-A	11/14/95	920
Crowdabout Creek	Site 10-A	12/4/95	4,500
Crowdabout Creek	Site 10-A	1/9/96	173
Crowdabout Creek	Site 10-A	2/6/96	240
Crowdabout Creek	Site 10-A	3/5/96	350
Crowdabout Creek	Site 10-A	3/19/96	26,000
Crowdabout Creek	Site 10-A	4/8/96	213
Crowdabout Creek	Site 10-A	5/6/96	650
Crowdabout Creek	Site 10-A	6/4/96	550
Crowdabout Creek	Site 10-A	7/1/96	173
Crowdabout Creek	Site 10-A	8/5/96	875
Crowdabout Creek	Site 10-A	9/3/96	1,030
Crowdabout Creek	Site 10-A	9/17/96	800,000
Crowdabout Creek	Site 10-A	10/1/96	7,100
Crowdabout Creek	Site 10-A	11/4/96	5,700
Crowdabout Creek	Site 10-A	12/2/96	2,300
Crowdabout Creek	Site 10-A	1/6/97	3,000
Crowdabout Creek	Site 10-A	2/3/97	350
Crowdabout Creek	Site 10-A	2/27/97	30,000
Crowdabout Creek	Site 10-A	3/3/97	9,200
Crowdabout Creek	Site 10-A	4/1/97	70
Crowdabout Creek	Site 10-A	5/5/97	2,000
Crowdabout Creek	Site 10-A	6/3/97	9,750
Crowdabout Creek	Site 10-A	7/14/97	250
Crowdabout Creek	Site 10-A	8/4/97	290
Crowdabout Creek	Site 10-A	9/2/97	260
Crowdabout Creek	Site 10-A	10/1/97	940
Crowdabout Creek	Site 10-A	11/3/97	680
Crowdabout Creek	Site 10-A	11/6/97	480
Crowdabout Creek	Site 10-A	12/1/97	4,200
Flint Creek	Site 1	1/12/95	370
Flint Creek	Site 1	2/7/95	87
Flint Creek	Site 1	3/14/95	67
Flint Creek	Site 1	4/11/95	18
Flint Creek	Site 1	5/2/95	167
Flint Creek	Site 1	6/7/95	180
Flint Creek	Site 1	7/18/95	360
Flint Creek	Site 1	8/8/95	320
Flint Creek	Site 1	9/6/95	230
Flint Creek	Site 1	10/11/95	520

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 1	11/14/95	680
Flint Creek	Site 1	12/5/95	210
Flint Creek	Site 1	1/9/96	2,300
Flint Creek	Site 1	2/6/96	43
Flint Creek	Site 1	3/5/96	166
Flint Creek	Site 1	4/9/96	50
Flint Creek	Site 1	5/7/96	107
Flint Creek	Site 1	6/5/96	40
Flint Creek	Site 1	7/2/96	90
Flint Creek	Site 1	8/6/96	1,800
Flint Creek	Site 1	9/4/96	2,300
Flint Creek	Site 1	10/2/96	240
Flint Creek	Site 1	11/5/96	350
Flint Creek	Site 1	12/3/96	3,600
Flint Creek	Site 1	1/7/97	6,000
Flint Creek	Site 1	2/4/97	200
Flint Creek	Site 1	3/4/97	2,500
Flint Creek	Site 1	4/2/97	47
Flint Creek	Site 1	5/6/97	140
Flint Creek	Site 1	6/4/97	140
Flint Creek	Site 1	7/15/97	193
Flint Creek	Site 1	8/5/97	310
Flint Creek	Site 1	9/3/97	130
Flint Creek	Site 1	10/2/97	170
Flint Creek	Site 1	11/4/97	83
Flint Creek	Site 1	12/2/97	260
Flint Creek	Site 2	1/12/95	370
Flint Creek	Site 2	2/7/95	80
Flint Creek	Site 2	3/14/95	136
Flint Creek	Site 2	4/11/95	56
Flint Creek	Site 2	5/2/95	500
Flint Creek	Site 2	6/7/95	190
Flint Creek	Site 2	7/18/95	120
Flint Creek	Site 2	8/8/95	60
Flint Creek	Site 2	9/6/95	47
Flint Creek	Site 2	10/11/95	140
Flint Creek	Site 2	11/14/95	400
Flint Creek	Site 2	12/5/95	193
Flint Creek	Site 2	1/9/96	1,140
Flint Creek	Site 2	2/6/96	30
Flint Creek	Site 2	3/5/96	113
Flint Creek	Site 2	4/9/96	73
Flint Creek	Site 2	5/7/96	73
Flint Creek	Site 2	6/5/96	47
Flint Creek	Site 2	7/2/96	27
Flint Creek	Site 2	8/6/96	300
Flint Creek	Site 2	9/4/96	20,000
Flint Creek	Site 2	10/2/96	270
Flint Creek	Site 2	11/5/96	620
Flint Creek	Site 2	12/3/96	4,500

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 2	1/7/97	4,200
Flint Creek	Site 2	2/4/97	210
Flint Creek	Site 2	3/4/97	2,300
Flint Creek	Site 2	4/2/97	53
Flint Creek	Site 2	5/6/97	280
Flint Creek	Site 2	6/4/97	240
Flint Creek	Site 2	7/15/97	107
Flint Creek	Site 2	8/5/97	480
Flint Creek	Site 2	9/3/97	43
Flint Creek	Site 2	10/2/97	160
Flint Creek	Site 2	11/4/97	370
Flint Creek	Site 2	12/2/97	580
Flint Creek	Site 3	1/11/95	340
Flint Creek	Site 3	2/7/95	163
Flint Creek	Site 3	3/14/95	200
Flint Creek	Site 3	4/11/95	62
Flint Creek	Site 3	5/1/95	2,000
Flint Creek	Site 3	6/6/95	220
Flint Creek	Site 3	7/17/95	250
Flint Creek	Site 3	8/8/95	60
Flint Creek	Site 3	9/5/95	780
Flint Creek	Site 3	10/11/95	400
Flint Creek	Site 3	11/14/95	420
Flint Creek	Site 3	12/5/95	640
Flint Creek	Site 3	1/9/96	1,160
Flint Creek	Site 3	2/6/96	17
Flint Creek	Site 3	3/5/96	143
Flint Creek	Site 3	4/9/96	83
Flint Creek	Site 3	5/7/96	53
Flint Creek	Site 3	6/5/96	50
Flint Creek	Site 3	7/2/96	60
Flint Creek	Site 3	8/6/96	113
Flint Creek	Site 3	9/4/96	6,200
Flint Creek	Site 3	10/2/96	390
Flint Creek	Site 3	11/5/96	2,200
Flint Creek	Site 3	12/3/96	4,900
Flint Creek	Site 3	1/7/97	4,000
Flint Creek	Site 3	2/4/97	230
Flint Creek	Site 3	3/4/97	3,600
Flint Creek	Site 3	4/2/97	57
Flint Creek	Site 3	5/6/97	280
Flint Creek	Site 3	6/3/97	3,000
Flint Creek	Site 3	7/15/97	53
Flint Creek	Site 3	8/5/97	660
Flint Creek	Site 3	9/3/97	100
Flint Creek	Site 3	10/1/97	250
Flint Creek	Site 3	11/4/97	200
Flint Creek	Site 3	12/2/97	710
Flint Creek	Site 4	1/11/95	220
Flint Creek	Site 4	2/7/95	147

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 4	3/14/95	200
Flint Creek	Site 4	4/11/95	88
Flint Creek	Site 4	4/12/95	230
Flint Creek	Site 4	5/1/95	1,620
Flint Creek	Site 4	6/6/95	250
Flint Creek	Site 4	7/17/95	47
Flint Creek	Site 4	8/8/95	730
Flint Creek	Site 4	9/5/95	147
Flint Creek	Site 4	10/3/95	56,000
Flint Creek	Site 4	10/11/95	180
Flint Creek	Site 4	11/14/95	340
Flint Creek	Site 4	12/5/95	1,180
Flint Creek	Site 4	1/9/96	1,060
Flint Creek	Site 4	2/6/96	37
Flint Creek	Site 4	3/5/96	230
Flint Creek	Site 4	3/19/96	8,600
Flint Creek	Site 4	4/9/96	123
Flint Creek	Site 4	5/7/96	67
Flint Creek	Site 4	6/5/96	67
Flint Creek	Site 4	7/2/96	60
Flint Creek	Site 4	8/6/96	220
Flint Creek	Site 4	9/4/96	550
Flint Creek	Site 4	9/17/96	42,000
Flint Creek	Site 4	10/2/96	620
Flint Creek	Site 4	11/5/96	640
Flint Creek	Site 4	12/3/96	4,700
Flint Creek	Site 4	1/7/97	1,550
Flint Creek	Site 4	2/4/97	320
Flint Creek	Site 4	2/27/97	2,500
Flint Creek	Site 4	3/4/97	4,400
Flint Creek	Site 4	4/2/97	67
Flint Creek	Site 4	5/6/97	240
Flint Creek	Site 4	6/3/97	3,300
Flint Creek	Site 4	7/15/97	83
Flint Creek	Site 4	8/5/97	73
Flint Creek	Site 4	9/3/97	67
Flint Creek	Site 4	10/1/97	340
Flint Creek	Site 4	11/4/97	170
Flint Creek	Site 4	11/6/97	150
Flint Creek	Site 4	12/2/97	560
Flint Creek	Site 5	1/11/95	320
Flint Creek	Site 5	2/6/95	70
Flint Creek	Site 5	3/13/95	198
Flint Creek	Site 5	4/10/95	62
Flint Creek	Site 5	5/1/95	1,030
Flint Creek	Site 5	5/2/95	2,200
Flint Creek	Site 5	6/6/95	420
Flint Creek	Site 5	7/17/95	540
Flint Creek	Site 5	8/7/95	26,000
Flint Creek	Site 5	9/5/95	330
Flint Creek	Site 5	10/10/95	500
Flint Creek	Site 5	11/2/95	8,300
Flint Creek	Site 5	11/13/95	620
Flint Creek	Site 5	12/4/95	370

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 5	1/8/96	965
Flint Creek	Site 5	2/5/96	17
Flint Creek	Site 5	3/4/96	97
Flint Creek	Site 5	4/8/96	70
Flint Creek	Site 5	4/23/96	1,600
Flint Creek	Site 5	5/6/96	120
Flint Creek	Site 5	6/4/96	103
Flint Creek	Site 5	7/1/96	100
Flint Creek	Site 5	8/5/96	600
Flint Creek	Site 5	9/3/96	1,500
Flint Creek	Site 5	10/1/96	1,240
Flint Creek	Site 5	11/4/96	3,400
Flint Creek	Site 5	11/18/96	187
Flint Creek	Site 5	12/2/96	6,400
Flint Creek	Site 5	1/6/97	5,300
Flint Creek	Site 5	2/3/97	60
Flint Creek	Site 5	3/3/97	6,300
Flint Creek	Site 5	3/5/97	780
Flint Creek	Site 5	4/1/97	87
Flint Creek	Site 5	5/5/97	480
Flint Creek	Site 5	6/3/97	3,800
Flint Creek	Site 5	7/14/97	240
Flint Creek	Site 5	8/4/97	67
Flint Creek	Site 5	9/2/97	123
Flint Creek	Site 5	10/1/97	590
Flint Creek	Site 5	11/3/97	520
Flint Creek	Site 5	11/13/97	110
Flint Creek	Site 5	12/1/97	800
Flint Creek	Site 6	1/11/95	5,900
Flint Creek	Site 6	2/6/95	40
Flint Creek	Site 6	3/13/95	117
Flint Creek	Site 6	4/10/95	124
Flint Creek	Site 6	5/1/95	1,030
Flint Creek	Site 6	6/6/95	510
Flint Creek	Site 6	7/17/95	250
Flint Creek	Site 6	8/7/95	18,000
Flint Creek	Site 6	9/5/95	420
Flint Creek	Site 6	10/10/95	113
Flint Creek	Site 6	11/13/95	420
Flint Creek	Site 6	12/4/95	143
Flint Creek	Site 6	1/8/96	163
Flint Creek	Site 6	2/5/96	27
Flint Creek	Site 6	3/4/96	240
Flint Creek	Site 6	4/8/96	133
Flint Creek	Site 6	5/6/96	147
Flint Creek	Site 6	6/4/96	270
Flint Creek	Site 6	7/1/96	170
Flint Creek	Site 6	8/5/96	750
Flint Creek	Site 6	9/3/96	104,000
Flint Creek	Site 6	10/1/96	910

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 6	11/4/96	7,000
Flint Creek	Site 6	12/2/96	3,300
Flint Creek	Site 6	1/6/97	5,000
Flint Creek	Site 6	2/3/97	150
Flint Creek	Site 6	3/3/97	4,300
Flint Creek	Site 6	4/1/97	73
Flint Creek	Site 6	5/5/97	710
Flint Creek	Site 6	6/3/97	4,300
Flint Creek	Site 6	7/14/97	143
Flint Creek	Site 6	8/4/97	203
Flint Creek	Site 6	9/2/97	200
Flint Creek	Site 6	10/1/97	650
Flint Creek	Site 6	11/3/97	310
Flint Creek	Site 6	12/1/97	710
Flint Creek	Site 7	1/11/95	130
Flint Creek	Site 7	2/6/95	30
Flint Creek	Site 7	2/27/95	150
Flint Creek	Site 7	3/13/95	130
Flint Creek	Site 7	4/10/95	146
Flint Creek	Site 7	5/1/95	800
Flint Creek	Site 7	6/6/95	370
Flint Creek	Site 7	6/7/95	35,000
Flint Creek	Site 7	7/17/95	780
Flint Creek	Site 7	8/7/95	21,000
Flint Creek	Site 7	9/5/95	40
Flint Creek	Site 7	10/10/95	4,800
Flint Creek	Site 7	11/13/95	400
Flint Creek	Site 7	12/4/95	1,480
Flint Creek	Site 7	1/8/96	77
Flint Creek	Site 7	2/5/96	50
Flint Creek	Site 7	3/4/96	83
Flint Creek	Site 7	3/6/96	12,000
Flint Creek	Site 7	4/8/96	290
Flint Creek	Site 7	5/6/96	370
Flint Creek	Site 7	6/4/96	460
Flint Creek	Site 7	7/1/96	127
Flint Creek	Site 7	7/8/96	33,000
Flint Creek	Site 7	8/5/96	580
Flint Creek	Site 7	9/3/96	16,000
Flint Creek	Site 7	10/1/96	410
Flint Creek	Site 7	11/4/96	850
Flint Creek	Site 7	12/2/96	2,900
Flint Creek	Site 7	1/6/97	2,200
Flint Creek	Site 7	1/16/97	5,400
Flint Creek	Site 7	2/3/97	70
Flint Creek	Site 7	3/3/97	4,700
Flint Creek	Site 7	4/1/97	90
Flint Creek	Site 7	5/5/97	540
Flint Creek	Site 7	6/3/97	1,360
Flint Creek	Site 7	7/1/97	4,600

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Flint Creek	Site 7	7/14/97	186
Flint Creek	Site 7	8/4/97	400
Flint Creek	Site 7	9/2/97	560
Flint Creek	Site 7	10/1/97	630
Flint Creek	Site 7	11/3/97	290
Flint Creek	Site 7	12/1/97	380
Flint Creek	Site 8	1/10/95	700
Flint Creek	Site 8	2/6/95	23
Flint Creek	Site 8	3/13/95	83
Flint Creek	Site 8	4/10/95	116
Flint Creek	Site 8	5/1/95	333
Flint Creek	Site 8	6/6/95	220
Flint Creek	Site 8	7/17/95	250
Flint Creek	Site 8	8/7/95	23,000
Flint Creek	Site 8	9/5/95	13
Flint Creek	Site 8	10/10/95	340
Flint Creek	Site 8	11/13/95	143
Flint Creek	Site 8	12/4/95	157
Flint Creek	Site 8	1/8/96	67
Flint Creek	Site 8	2/7/96	63
Flint Creek	Site 8	3/4/96	10
Flint Creek	Site 8	4/8/96	80
Flint Creek	Site 8	5/6/96	153
Flint Creek	Site 8	6/4/96	60
Flint Creek	Site 8	7/1/96	23
Flint Creek	Site 8	8/5/96	220
Flint Creek	Site 8	9/3/96	103
Flint Creek	Site 8	10/1/96	300
Flint Creek	Site 8	11/4/96	380
Flint Creek	Site 8	12/2/96	150
Flint Creek	Site 8	1/6/97	580
Flint Creek	Site 8	2/3/97	5,600
Flint Creek	Site 8	3/3/97	4,500
Flint Creek	Site 8	4/1/97	17
Flint Creek	Site 8	5/5/97	290
Flint Creek	Site 8	6/3/97	10,900
Flint Creek	Site 8	7/14/97	133
Flint Creek	Site 8	8/4/97	157
Flint Creek	Site 8	9/2/97	87
Flint Creek	Site 8	10/1/97	270
Flint Creek	Site 8	11/3/97	190
Flint Creek	Site 8	12/1/97	100
No Business Creek	Site 11	5/2/95	4,300
No Business Creek	Site 11	11/2/95	5,100
No Business Creek	Site 11	4/23/96	2,100
No Business Creek	Site 11	11/18/96	2,100
No Business Creek	Site 11	3/3/97	6,900
No Business Creek	Site 11	11/13/97	100
Shoal Creek	Site 12	6/1/95	28,000
Shoal Creek	Site 12	11/14/95	1,040

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
Shoal Creek	Site 12	5/28/96	42,000
Shoal Creek	Site 12	11/25/96	4,500
Shoal Creek	Site 12	3/19/97	8,500
Shoal Creek	Site 12	12/4/97	680
West Flint Creek	Site 9-A	1/12/95	4,630
West Flint Creek	Site 9-A	2/7/95	83
West Flint Creek	Site 9-A	2/27/95	113
West Flint Creek	Site 9-A	3/14/95	143
West Flint Creek	Site 9-A	4/11/95	98
West Flint Creek	Site 9-A	5/2/95	667
West Flint Creek	Site 9-A	6/7/95	570
West Flint Creek	Site 9-A	6/8/95	780
West Flint Creek	Site 9-A	7/18/95	173
West Flint Creek	Site 9-A	8/8/95	200
West Flint Creek	Site 9-A	9/6/95	33
West Flint Creek	Site 9-A	10/11/95	163
West Flint Creek	Site 9-A	11/14/95	255
West Flint Creek	Site 9-A	12/5/95	260
West Flint Creek	Site 9-A	1/9/96	210
West Flint Creek	Site 9-A	2/6/96	67
West Flint Creek	Site 9-A	3/5/96	223
West Flint Creek	Site 9-A	3/6/96	18,000
West Flint Creek	Site 9-A	4/9/96	97
West Flint Creek	Site 9-A	5/7/96	93
West Flint Creek	Site 9-A	6/5/96	300
West Flint Creek	Site 9-A	7/2/96	107
West Flint Creek	Site 9-A	7/8/96	3,200
West Flint Creek	Site 9-A	8/6/96	330
West Flint Creek	Site 9-A	9/4/96	18,000
West Flint Creek	Site 9-A	10/2/96	880
West Flint Creek	Site 9-A	11/5/96	97
West Flint Creek	Site 9-A	12/3/96	210
West Flint Creek	Site 9-A	1/7/97	1,250
West Flint Creek	Site 9-A	1/16/97	7,300
West Flint Creek	Site 9-A	2/4/97	700
West Flint Creek	Site 9-A	3/4/97	2,000
West Flint Creek	Site 9-A	4/2/97	60
West Flint Creek	Site 9-A	5/6/97	350
West Flint Creek	Site 9-A	6/4/97	310
West Flint Creek	Site 9-A	7/1/97	5,900
West Flint Creek	Site 9-A	7/15/97	120
West Flint Creek	Site 9-A	8/5/97	113
West Flint Creek	Site 9-A	9/3/97	87
West Flint Creek	Site 9-A	10/2/97	190
West Flint Creek	Site 9-A	11/4/97	110
West Flint Creek	Site 9-A	12/2/97	120
West Flint Creek	Site 9-B	4/11/95	176
West Flint Creek	Site 9-B	5/3/95	1,170
West Flint Creek	Site 9-B	6/7/95	19,000
West Flint Creek	Site 9-B	7/18/95	250

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
West Flint Creek	Site 9-B	8/8/95	70
West Flint Creek	Site 9-B	9/6/95	33
West Flint Creek	Site 9-B	10/11/95	260
West Flint Creek	Site 9-B	11/15/95	193
West Flint Creek	Site 9-B	12/6/95	280
West Flint Creek	Site 9-B	1/9/96	200
West Flint Creek	Site 9-B	2/7/96	33
West Flint Creek	Site 9-B	3/5/96	293
West Flint Creek	Site 9-B	4/9/96	120
West Flint Creek	Site 9-B	5/7/96	147
West Flint Creek	Site 9-B	6/5/96	520
West Flint Creek	Site 9-B	7/2/96	123
West Flint Creek	Site 9-B	8/6/96	430
West Flint Creek	Site 9-B	9/4/96	7,300
West Flint Creek	Site 9-B	10/2/96	390
West Flint Creek	Site 9-B	11/5/96	143
West Flint Creek	Site 9-B	12/3/96	230
West Flint Creek	Site 9-B	1/7/97	900
West Flint Creek	Site 9-B	2/4/97	4,400
West Flint Creek	Site 9-B	3/4/97	2,300
West Flint Creek	Site 9-B	4/2/97	80
West Flint Creek	Site 9-B	5/6/97	370
West Flint Creek	Site 9-B	6/4/97	350
West Flint Creek	Site 9-B	7/15/97	240
West Flint Creek	Site 9-B	8/5/97	163
West Flint Creek	Site 9-B	9/3/97	196
West Flint Creek	Site 9-B	10/2/97	490
West Flint Creek	Site 9-B	11/4/97	140
West Flint Creek	Site 9-B	12/2/97	150
West Flint Creek	Site 9-C	4/11/95	230
West Flint Creek	Site 9-C	5/3/95	633
West Flint Creek	Site 9-C	6/7/95	1,700
West Flint Creek	Site 9-C	7/18/95	83
West Flint Creek	Site 9-C	8/8/95	350
West Flint Creek	Site 9-C	9/6/95	400
West Flint Creek	Site 9-C	10/11/95	200
West Flint Creek	Site 9-C	11/15/95	170
West Flint Creek	Site 9-C	12/6/95	176
West Flint Creek	Site 9-C	1/9/96	110
West Flint Creek	Site 9-C	2/7/96	97
West Flint Creek	Site 9-C	3/5/96	127
West Flint Creek	Site 9-C	4/9/96	57
West Flint Creek	Site 9-C	5/7/96	100
West Flint Creek	Site 9-C	6/5/96	180
West Flint Creek	Site 9-C	7/2/96	143
West Flint Creek	Site 9-C	8/6/96	157
West Flint Creek	Site 9-C	9/4/96	7,000
West Flint Creek	Site 9-C	10/2/96	250
West Flint Creek	Site 9-C	11/5/96	113
West Flint Creek	Site 9-C	12/3/96	90

Stream Name	Station	Date	1.1.1 Fecal Coliform (#/100 mL)
West Flint Creek	Site 9-C	1/7/97	1,250
West Flint Creek	Site 9-C	2/4/97	860
West Flint Creek	Site 9-C	3/4/97	890
West Flint Creek	Site 9-C	4/2/97	33
West Flint Creek	Site 9-C	5/6/97	180
West Flint Creek	Site 9-C	6/4/97	70
West Flint Creek	Site 9-C	7/15/97	90
West Flint Creek	Site 9-C	8/5/97	157
West Flint Creek	Site 9-C	9/3/97	113
West Flint Creek	Site 9-C	10/2/97	400
West Flint Creek	Site 9-C	11/4/97	100
West Flint Creek	Site 9-C	12/2/97	100

Appendix D

Hydrology Calibration for the Flint Creek Watershed

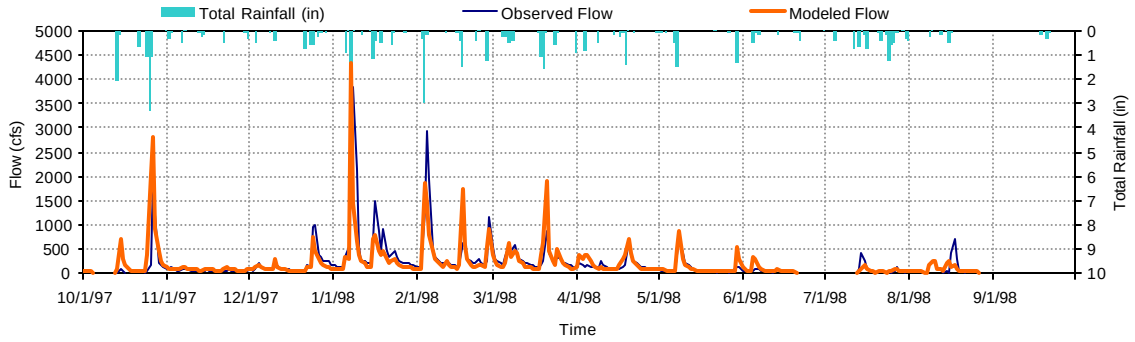

Figure D-1. Hydrology calibration at USGS gage 3577000 West Flint Creek for 10/1/97 through 9/30/98

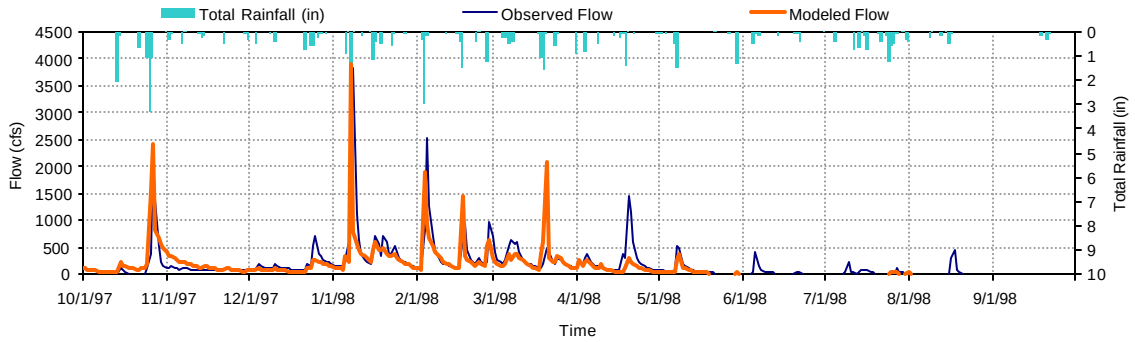

Figure D-2. Hydrology validation at USGS gage 3576500 Flint Creek for 10/1/97 through 9/30/98

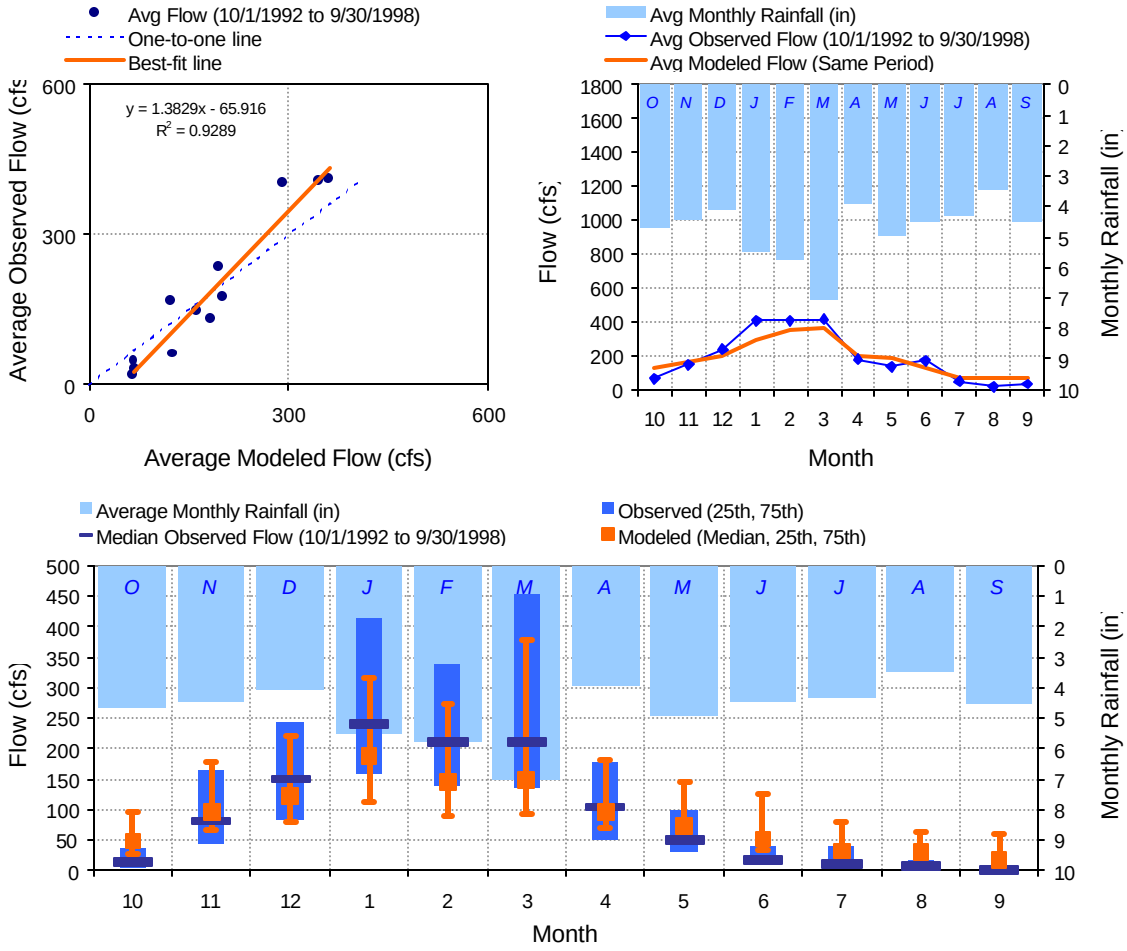

Figure D-3. Hydrology validation at USGS gage 3577000 West Flint Creek for 10/1/92 – 9/30/98

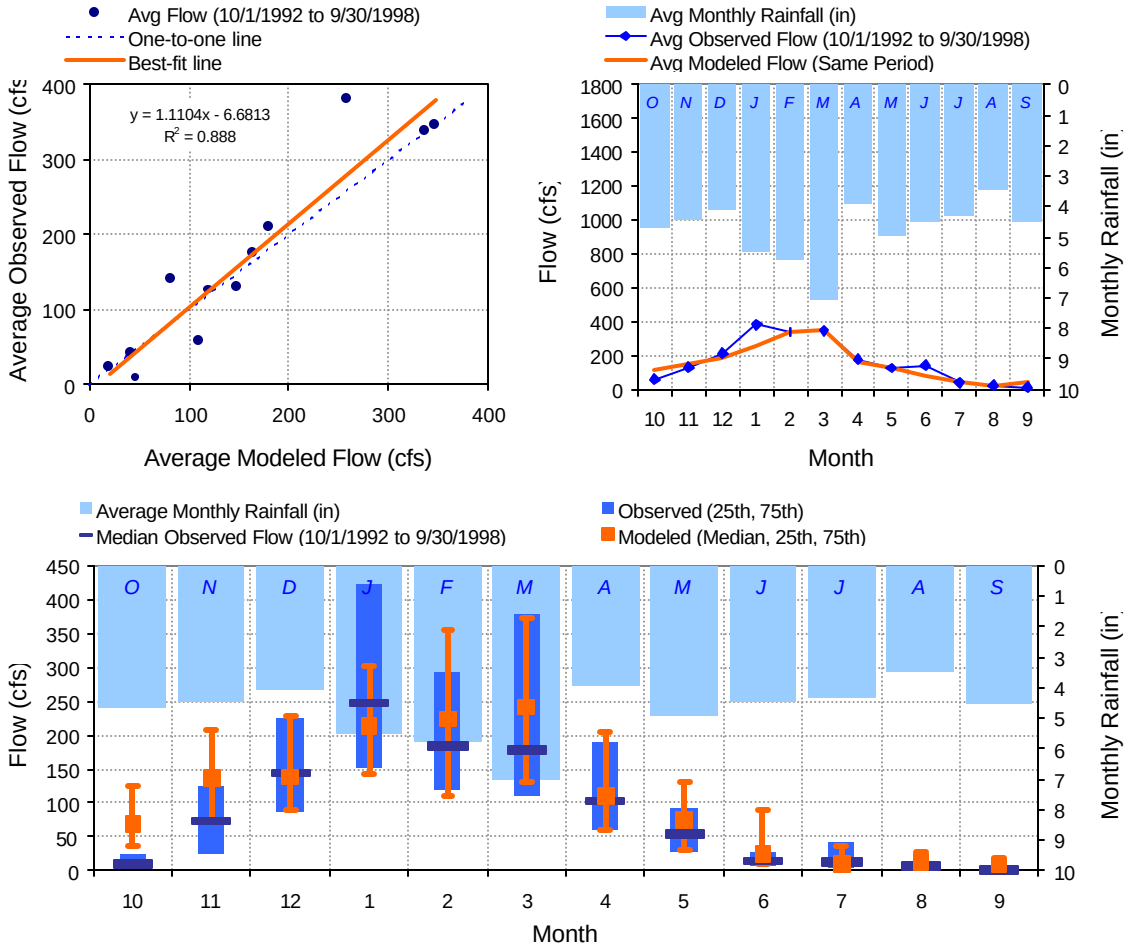

Figure D-4. Hydrology validation at USGS gage 3576500 Flint Creek for 10/1/92 through 9/30/98

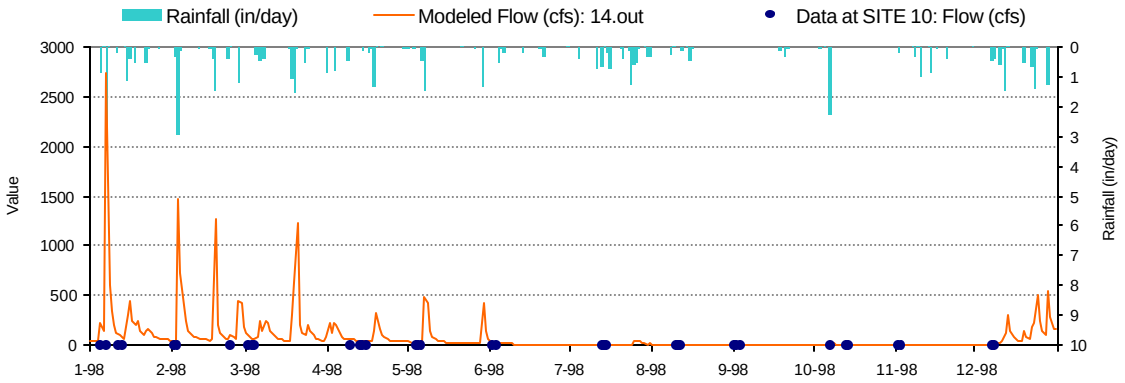

Figure D-5. Modeled flow versus observed flow at Site 10

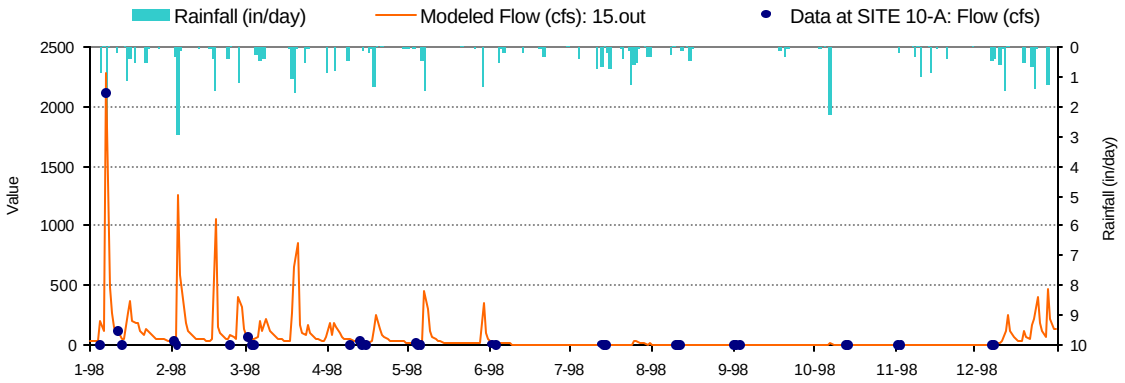

Figure D-6. Modeled flow versus observed flow at Site 10-A

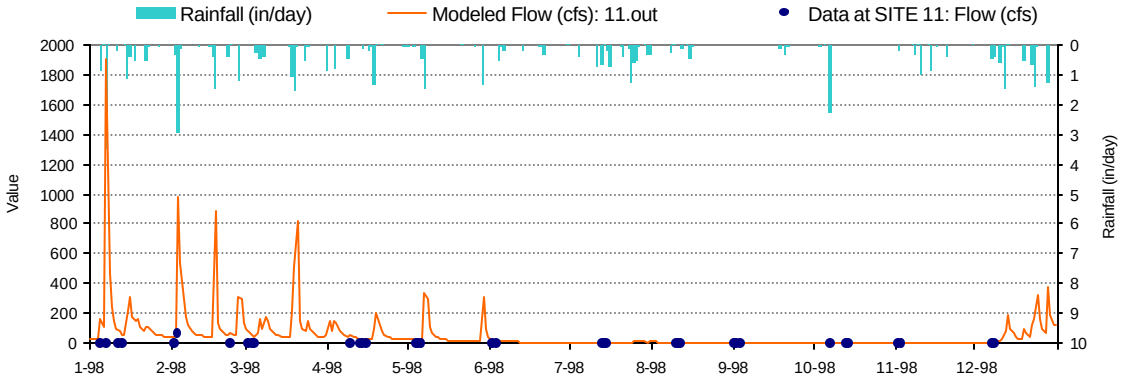

Figure D-7. Modeled flow versus observed flow at Site 11

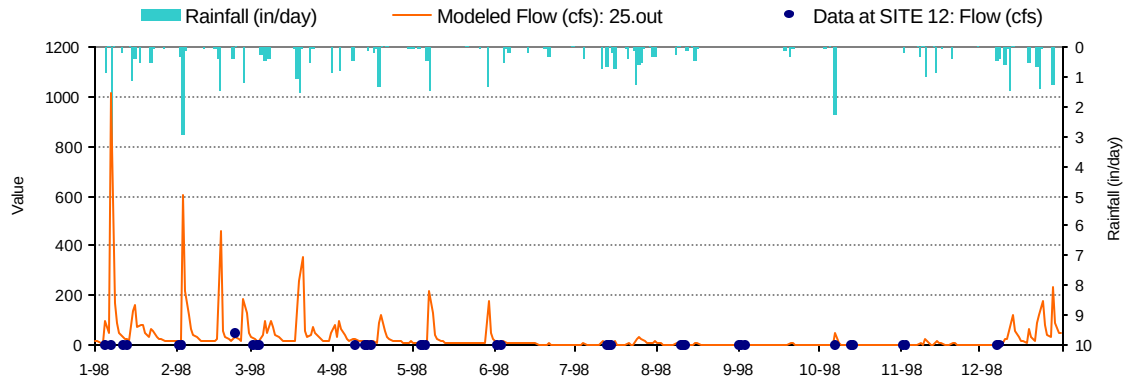

Figure D-8. Modeled flow versus observed flow at Site 12

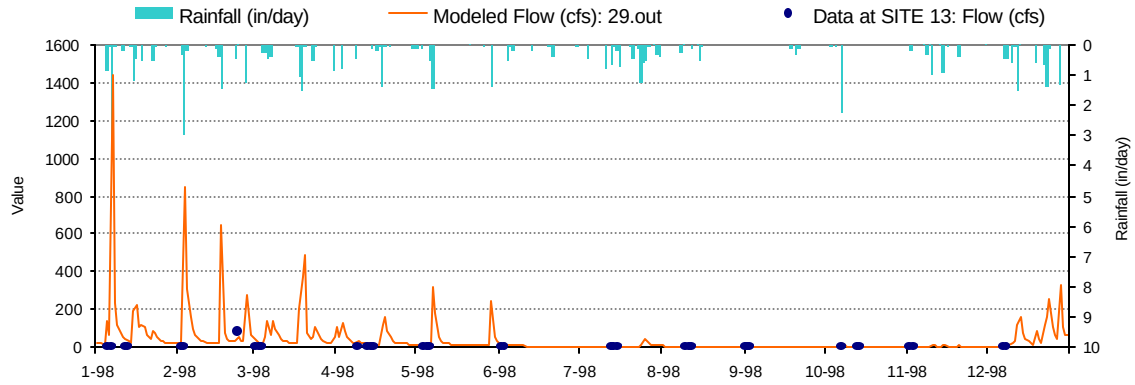

Figure D-9. Modeled flow versus observed flow at Site 13

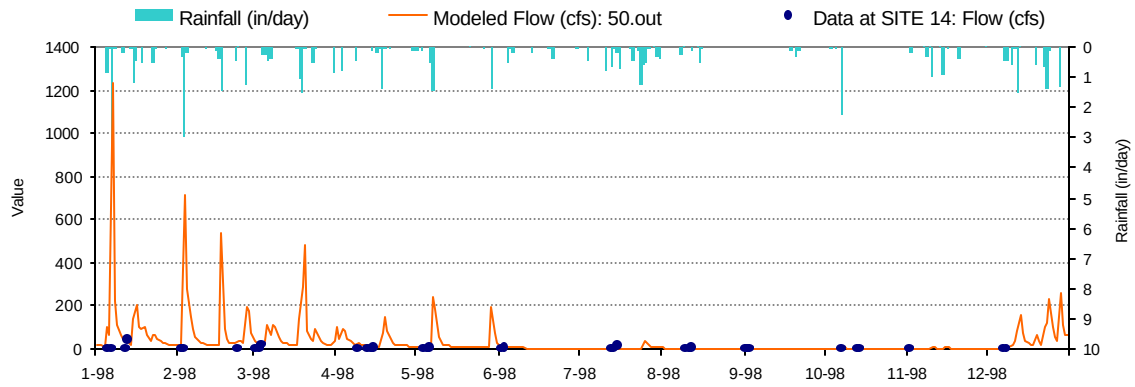

Figure D-10. Modeled flow versus observed flow at Site 14

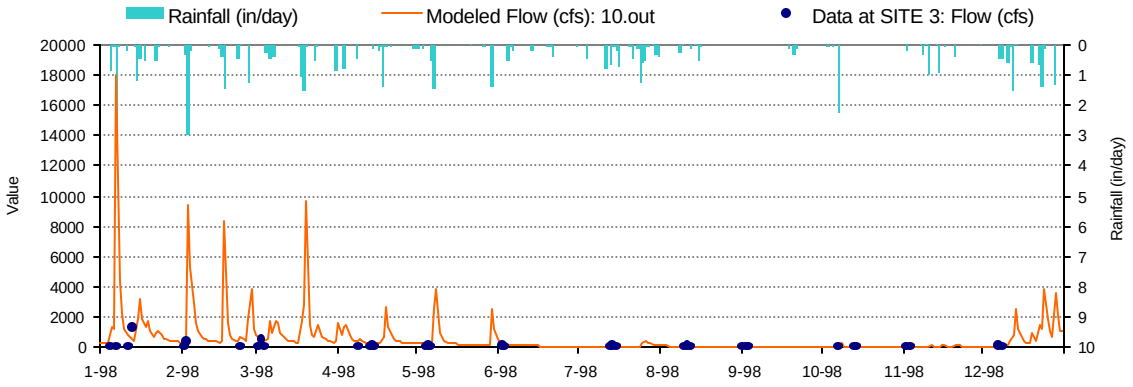

Figure D-11. Modeled versus observed flow at Site 3

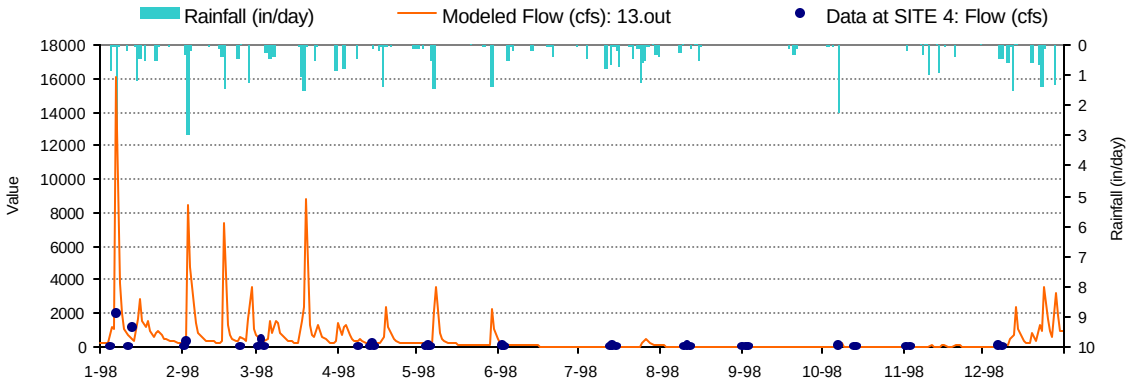

Figure D-12. Modeled versus observed flow at Site 4

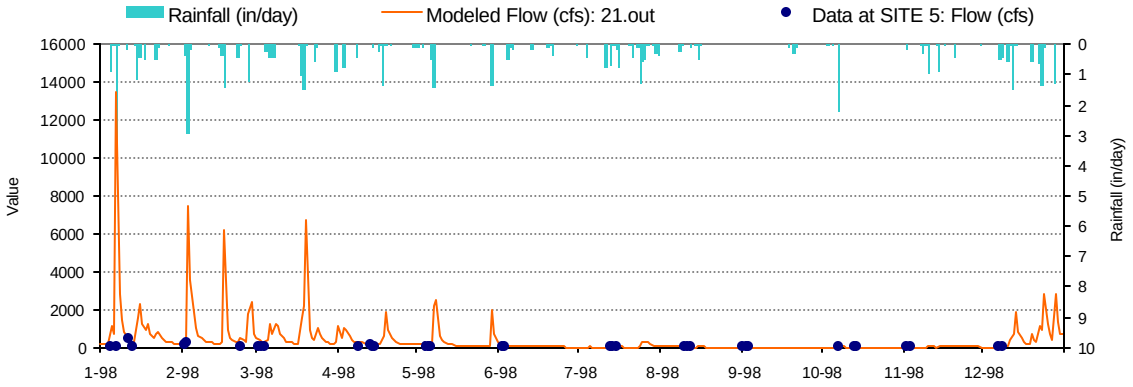

Figure D-13. Modeled versus observed flow at Site 5

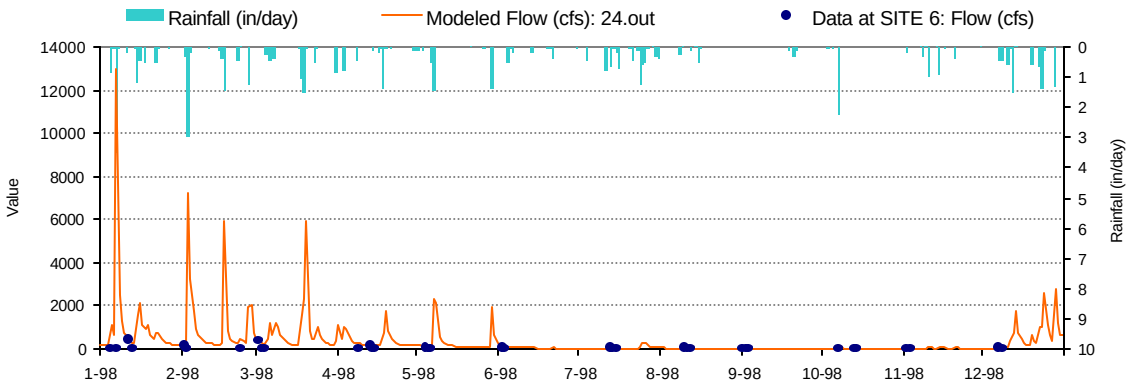

Figure D-14. Modeled versus observed flow at Site 6

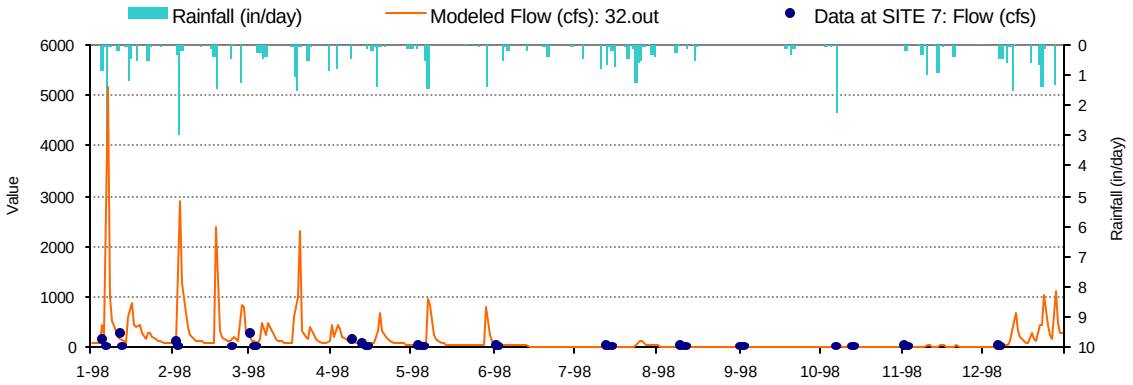

Figure D-15. Modeled versus observed flow at Site 7

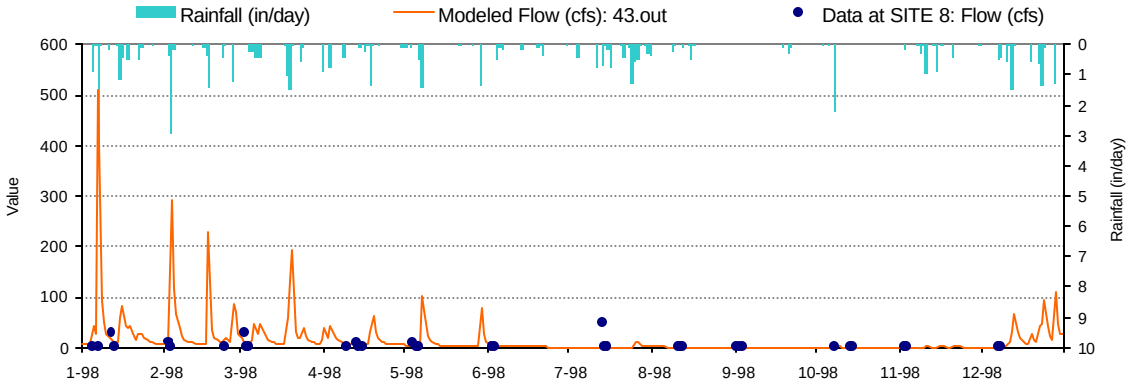

Figure D-16. Modeled versus observed flow at Site 8

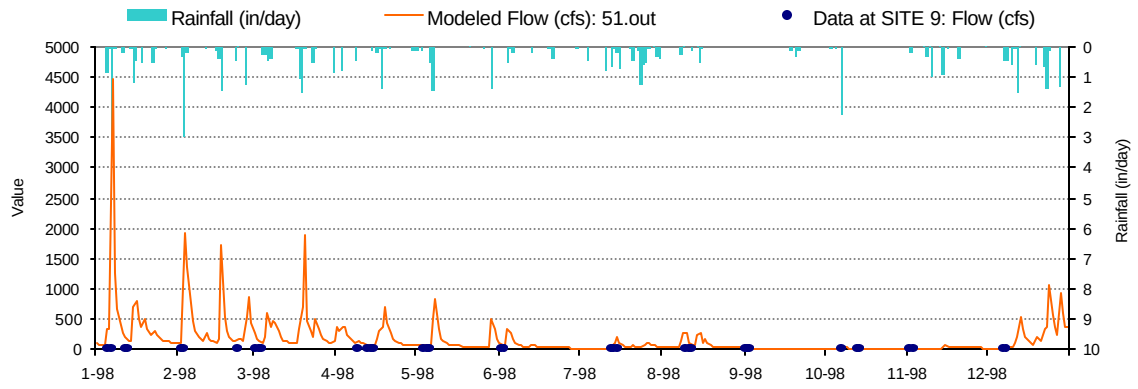

Figure D-17. Modeled versus observed flow at Site 9

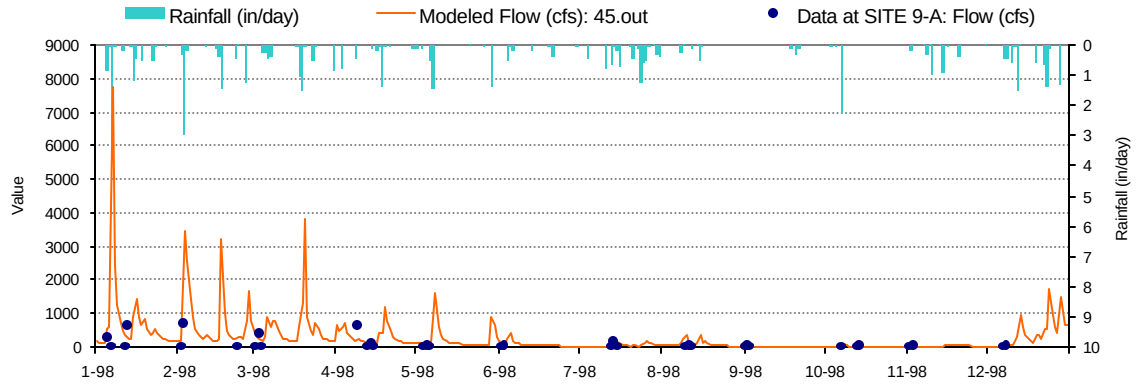

Figure D-18. Modeled versus observed flow at Site 9-A

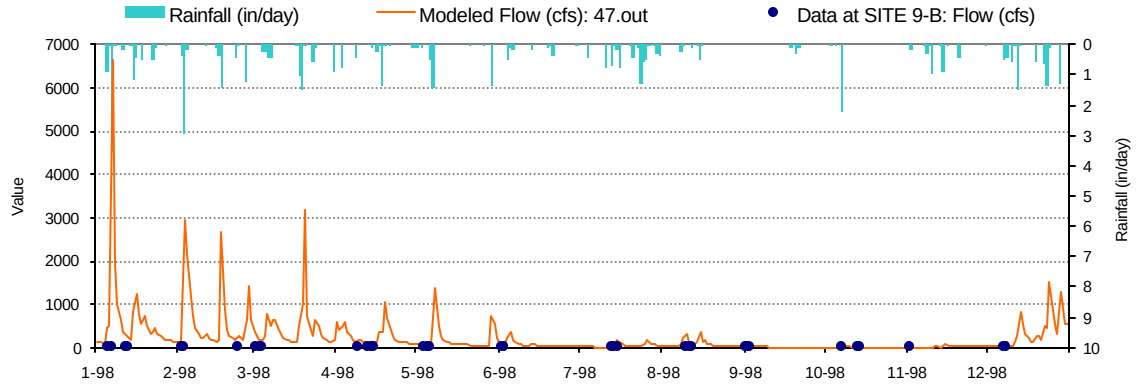

Figure D-19. Modeled versus observed flow at Site 9-B

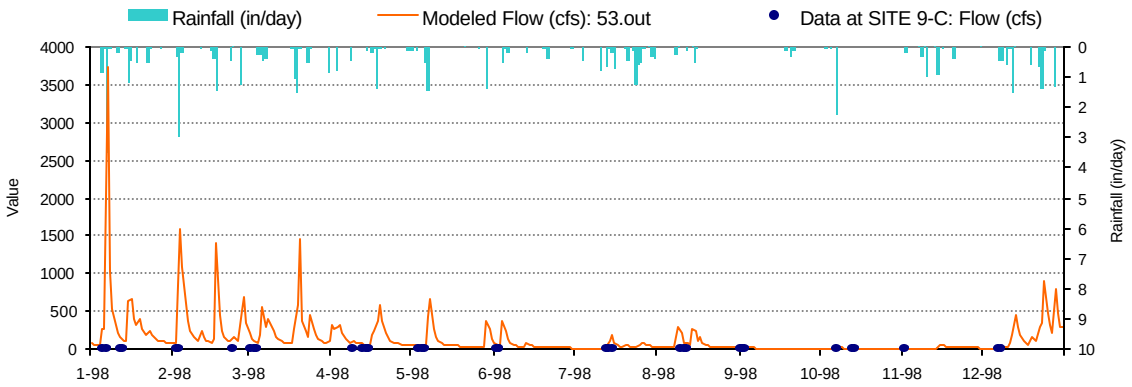

Figure D-20. Modeled versus observed flow at Site 9-C

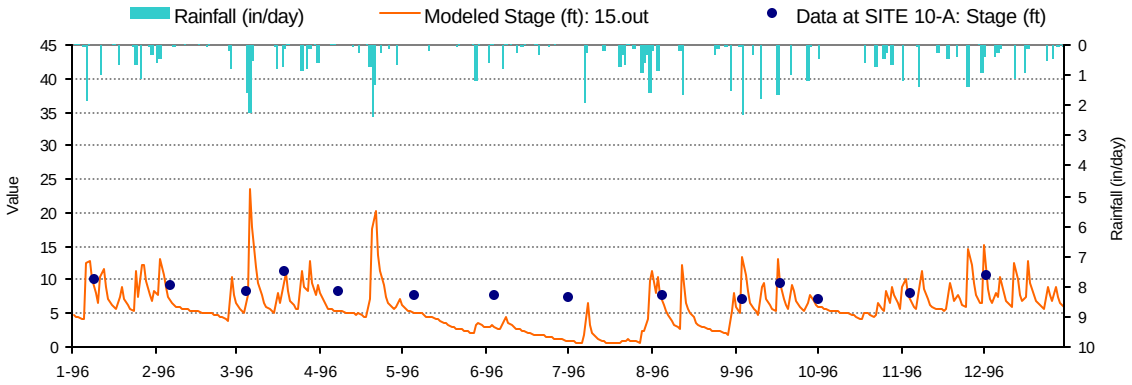

Figure D-21. Modeled stage versus observed stage (in feet) at Site 10-A Crowdabout Creek

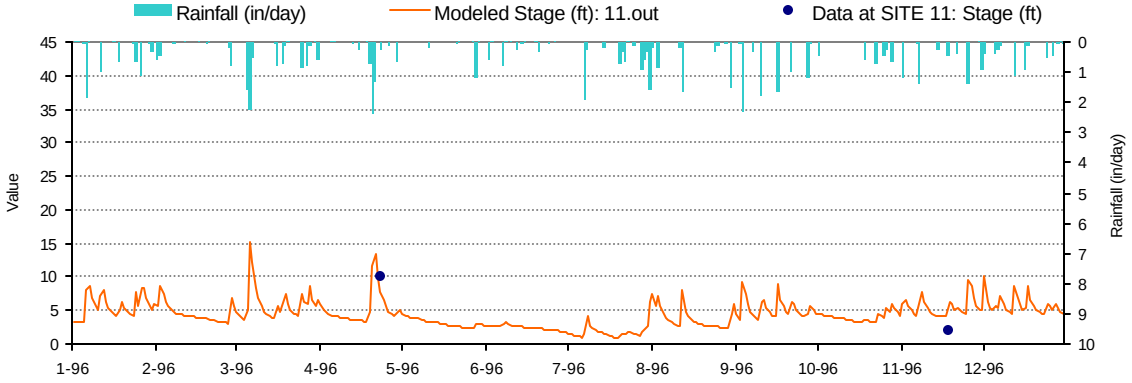

Figure D-22. Modeled stage versus observed stage (in feet) at Site 11 No Business Creek

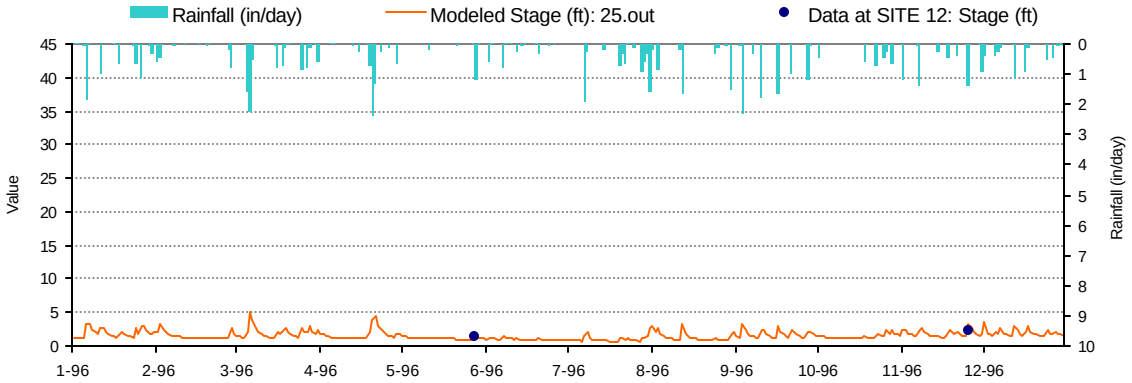

Figure D-23. Modeled stage versus observed stage (in feet) at Site 12 Shoal Creek

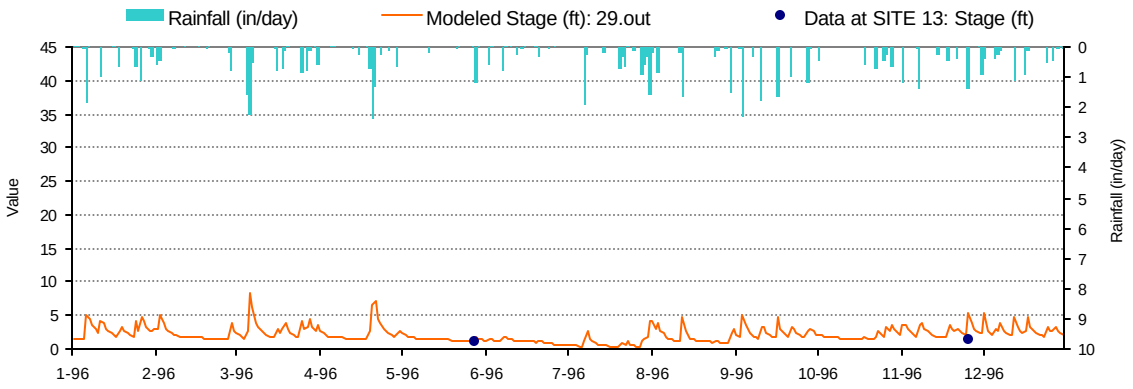

Figure D-24. Modeled stage versus observed stage (in feet) at Site 13 Cedar Creek

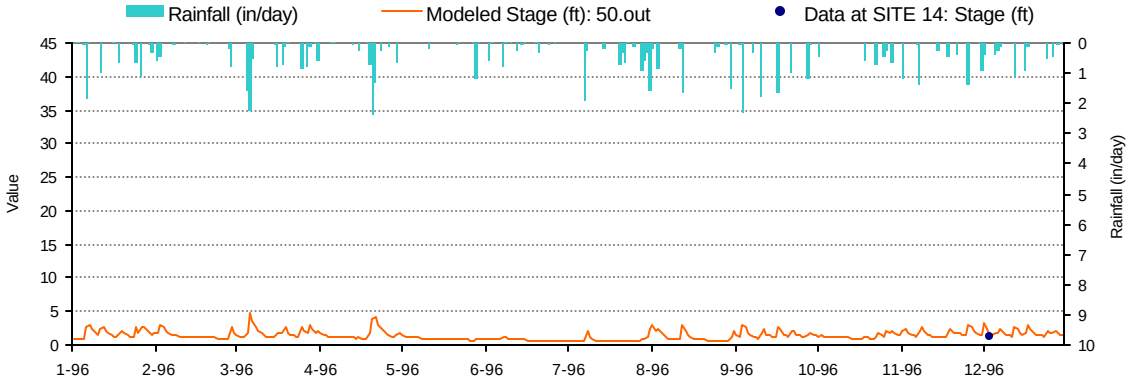

Figure D-25. Modeled stage versus observed stage (in feet) at Site 14 Big Shoal Creek

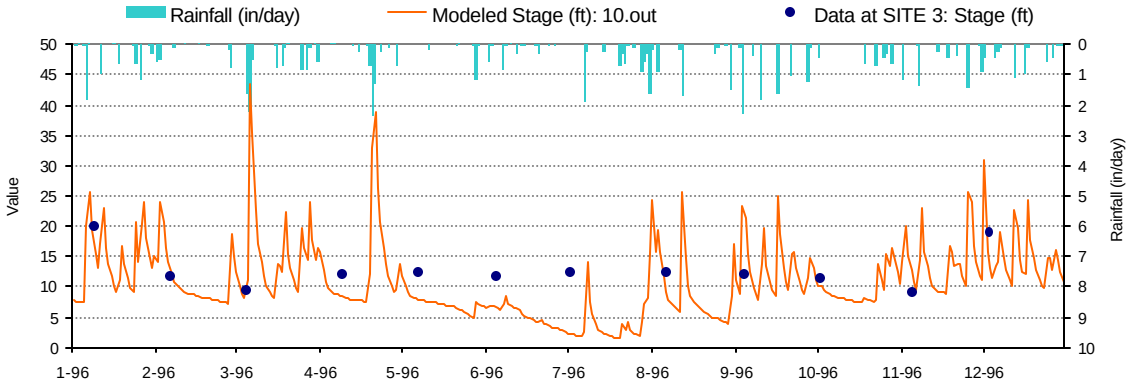

Figure D-26. Modeled stage versus observed stage (in feet) at Site 3 Flint Creek

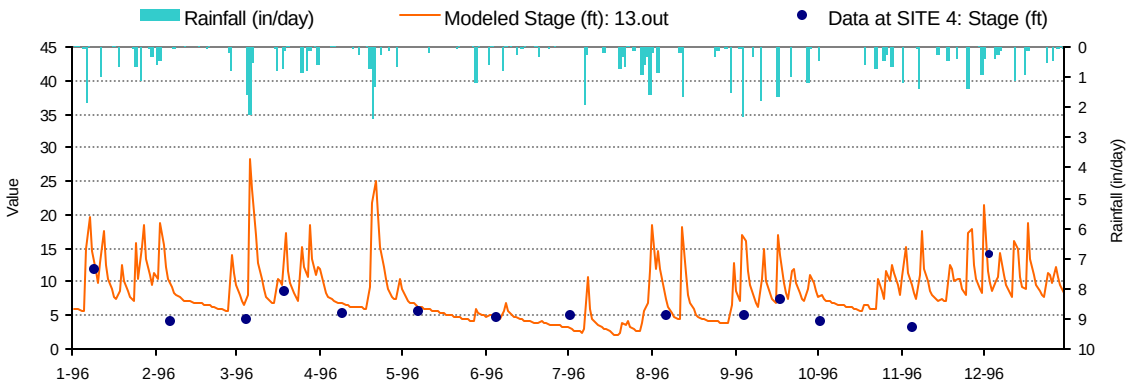

Figure D-27. Modeled versus observed stage (in feet) at Site 4 Flint Creek

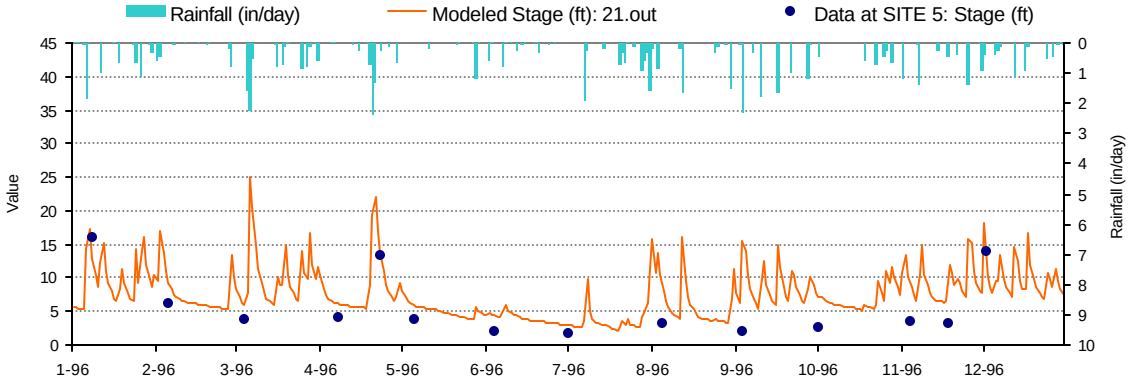

Figure D-28. Modeled versus observed stage (in feet) at Site 5 Flint Creek

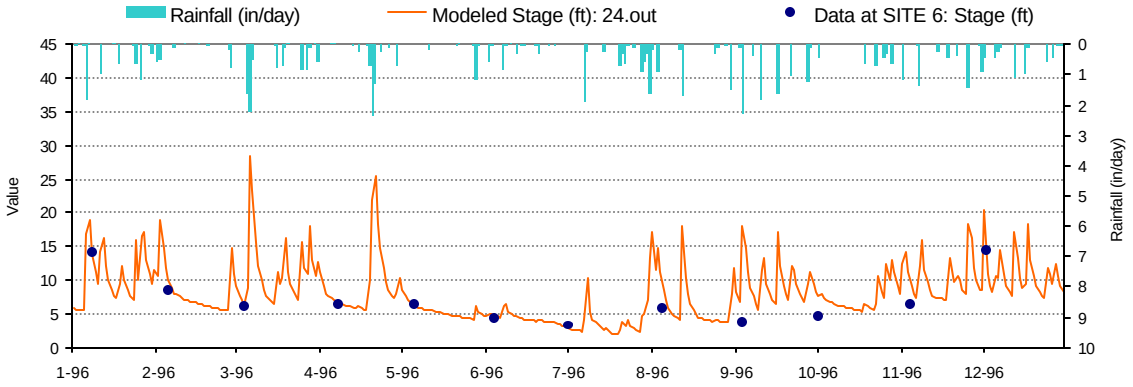

Figure D-29. Modeled versus observed stage (in feet) at Site 6 Flint Creek

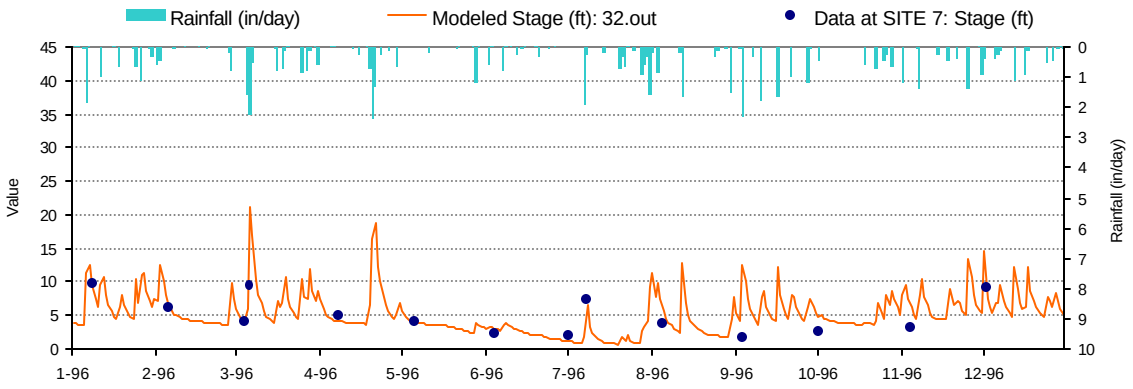

Figure D-30. Modeled versus observed stage (in feet) at Site 7 Flint Creek

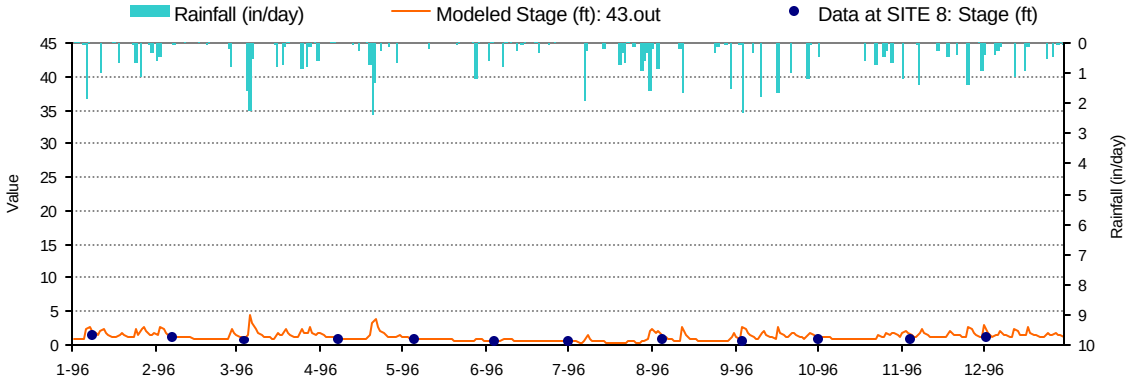

Figure D-31. Modeled versus observed stage (in feet) at Site 8 East Fork Flint Creek

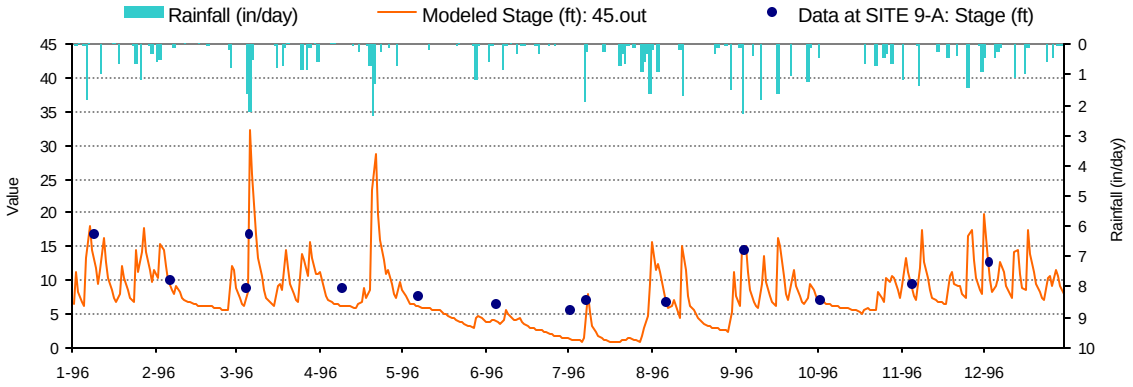

Figure D-32. Modeled versus observed stage (in feet) at Site 9A West Flint Creek

Appendix E

1.2 In-stream Cattle Counts

Table E-1. Cattle numbers by subwatershed in the Flint Creek watershed

Subbasin	Percent Adjacent	Percent Non-Adjacent	Number of Beef Cattle	Cattle at Sites Adjacent to Streams
1	0	1	34	0
2	0	1	459	0
3	0	1	6	0
4	0	1	298	0
5	0.163934426	0.836065574	948	155

Subbasin	Percent Adjacent	Percent Non-Adjacent	Number of Beef Cattle	Cattle at Sites Adjacent to Streams
6	0.144927536	0.855072464	48	7
7	0.144927536	0.855072464	615	89
8	0	1	6	0
9	0.07960199	0.92039801	488	39
10	0.07960199	0.92039801	48	4
11	0.12754159	0.87245841	2538	324
12	0.12754159	0.87245841	1834	234
13	0.07960199	0.92039801	476	38
14	0.184827586	0.815172414	1406	260
15	0.184827586	0.815172414	228	42
16	0.184827586	0.815172414	996	184
17	0.184827586	0.815172414	0	0
18	0.184827586	0.815172414	1048	194
19	0.184827586	0.815172414	2471	457
20	0.07960199	0.92039801	1030	82
21	0.07960199	0.92039801	37	3
22	0.37037037	0.62962963	572	212
23	0.07960199	0.92039801	1049	84
24	0.07960199	0.92039801	1318	105
25	0.227586207	0.772413793	0	0
26	0.227586207	0.772413793	3372	767
27	0.227586207	0.772413793	153	35
28	0.09009009	0.90990991	1047	94
29	0.140957447	0.859042553	1455	205
30	0.09009009	0.90990991	780	70
31	0.09009009	0.90990991	2	0
32	0.09009009	0.90990991	386	35
33	0.055555556	0.944444444	0	0
34	0.09009009	0.90990991	521	47
35	0.09009009	0.90990991	2	0
36	0	1	101	0
37	0.147058824	0.852941176	1557	229
38	0	1	1023	0
39	0.141104294	0.858895706	908	128
40	0	1	1673	0
41	0.087719298	0.912280702	51	5
42	0.044776119	0.955223881	1125	50
43	0.071038251	0.928961749	138	10
44	0.113718412	0.886281588	390	44
45	0.113718412	0.886281588	858	98
46	0.107438017	0.892561983	879	94

Subbasin	Percent Adjacent	Percent Non-Adjacent	Number of Beef Cattle	Cattle at Sites Adjacent to Streams
47	0.113718412	0.886281588	1364	155
48	0.139784946	0.860215054	617	86
49	0.113718412	0.886281588	23	3
50	0.107191316	0.892808684	1529	164
51	0.113718412	0.886281588	159	18
52	0.466257669	0.533742331	949	442
53	0.113718412	0.886281588	363	41
54	0.113718412	0.886281588	1365	155
55	0.163934426	0.836065574	248	41
56	0.163934426	0.836065574	463	76
57	0.163934426	0.836065574	891	146
58	0.163934426	0.836065574	234	38

Appendix F

Fecal Coliform Water Quality Calibration for the Flint Creek Watershed

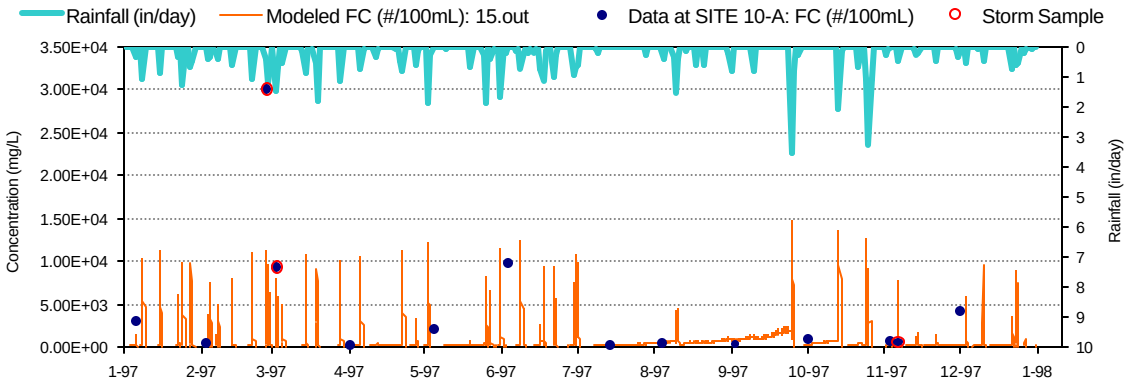

Figure F-1. Fecal coliform calibration at Site 10-A Crowdabout Creek

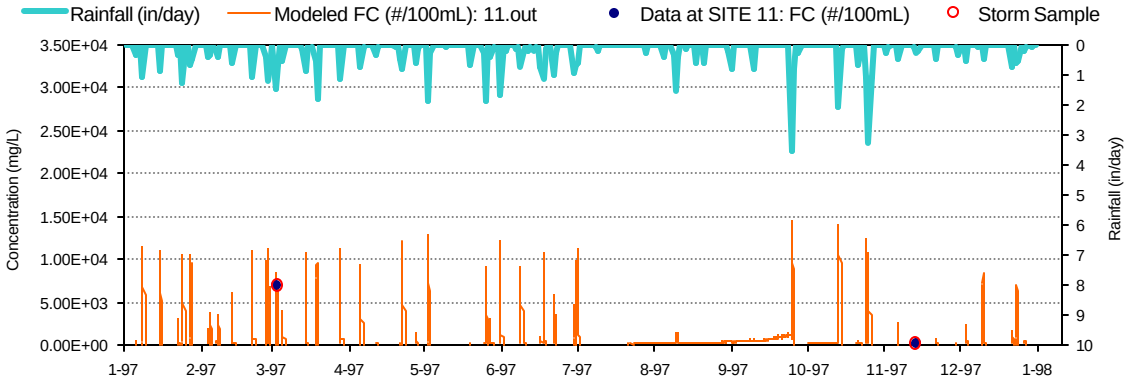

Figure F-2. Fecal coliform calibration at Site 11 No Business Creek

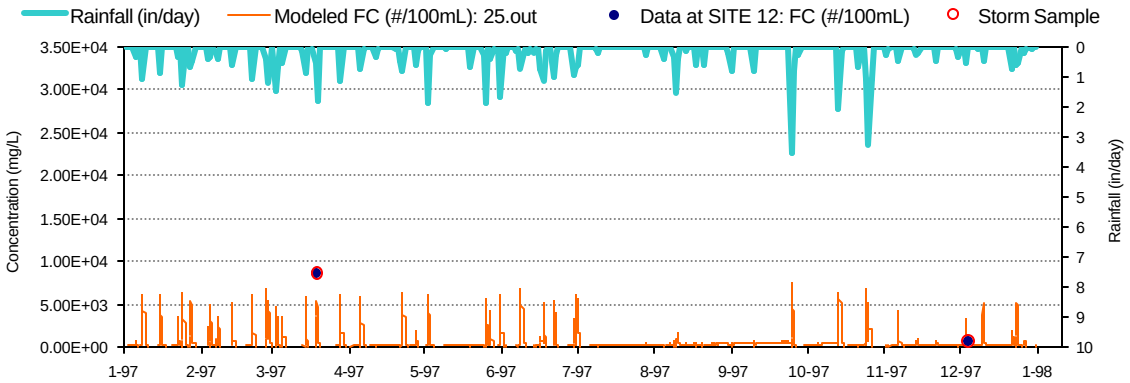

Figure F-3. Fecal coliform calibration at Site 12 Shoal Creek

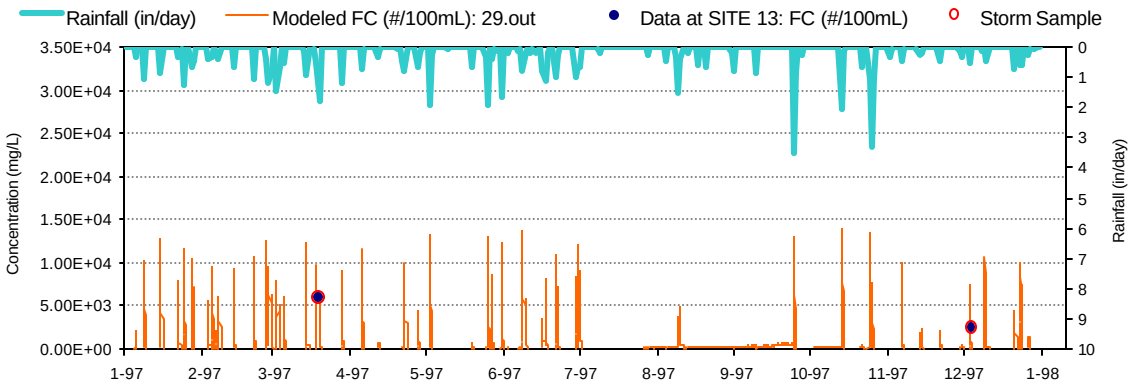

Figure F-4. Fecal coliform calibration at Site 13 Cedar Creek

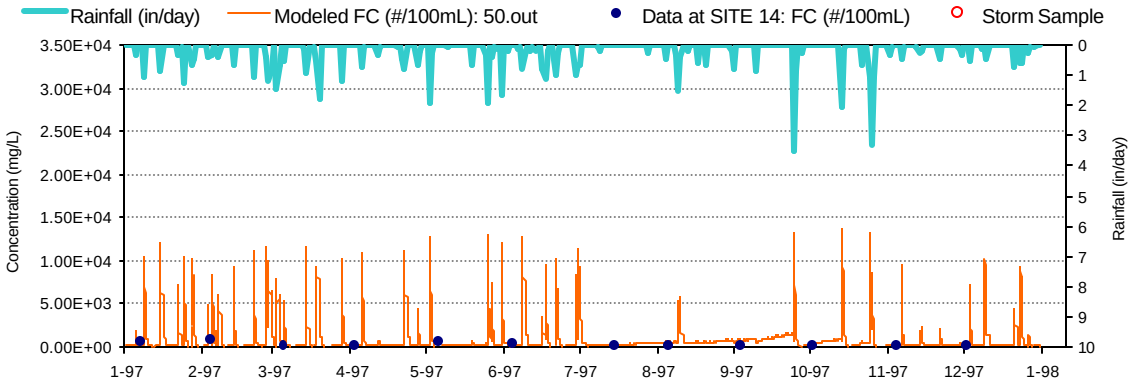

Figure F-5. Fecal coliform calibration at Site 14 Big Shoal Creek

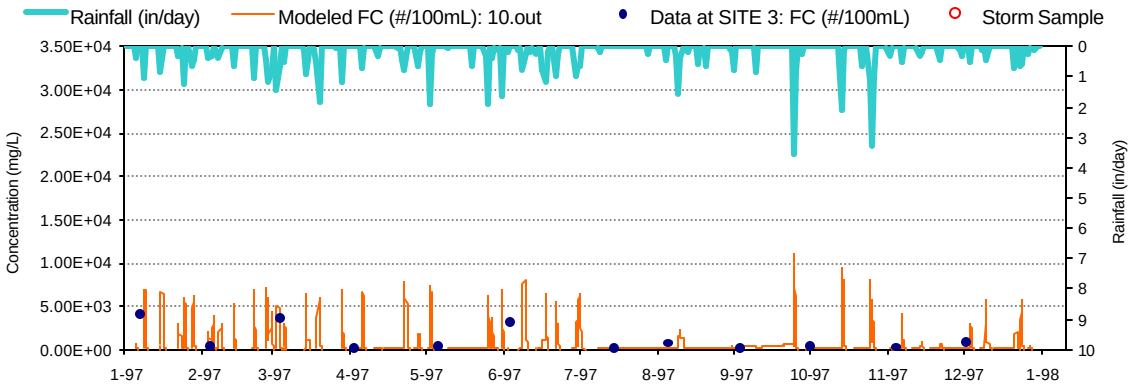

Figure F-6. Fecal coliform calibration at Site 3 Flint Creek

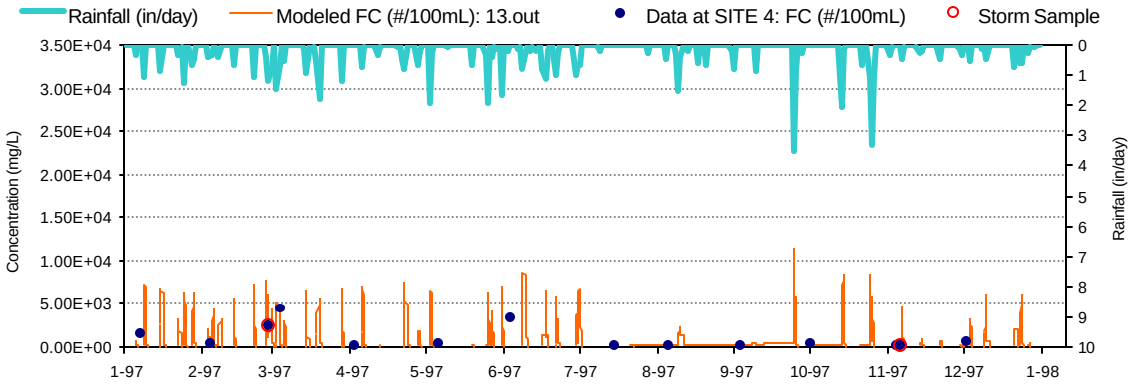

Figure F-7. Fecal coliform calibration at Site 4 Flint Creek

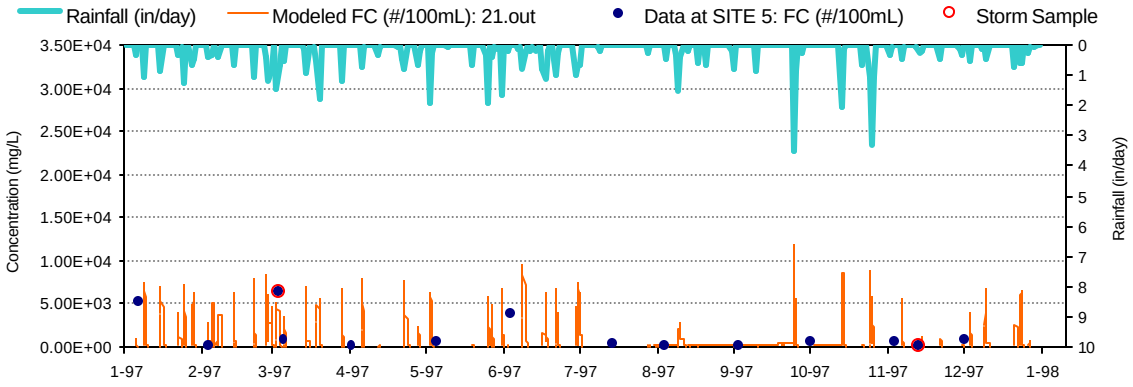

Figure F-8. Fecal coliform calibration at Site 5 Flint Creek

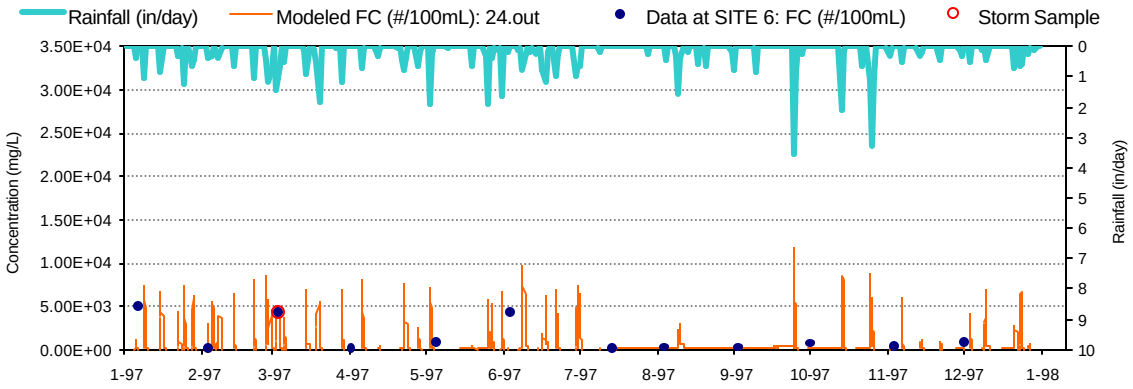

Figure F-9. Fecal coliform at Site 6 Flint Creek

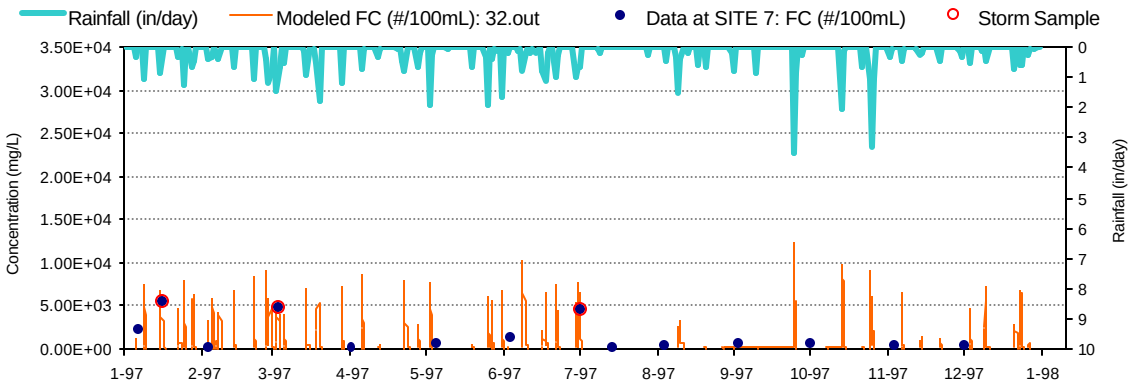

Figure F-10. Fecal coliform calibration at Site 7 Flint Creek

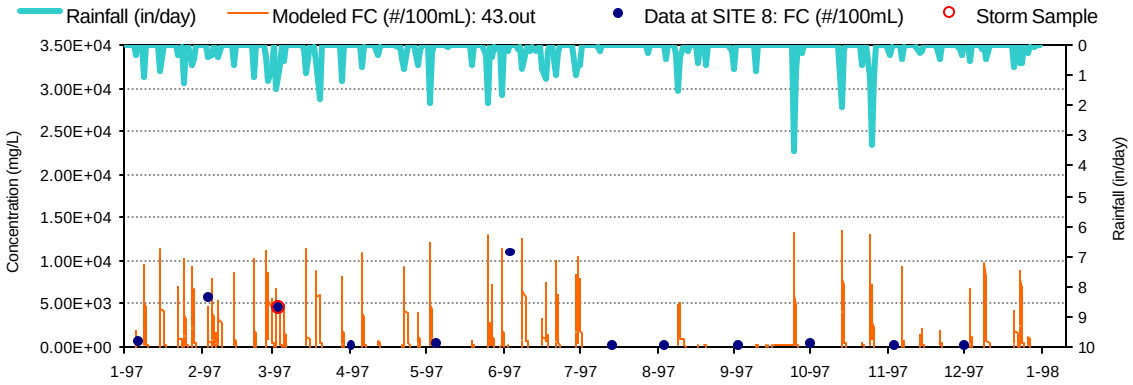

Figure F-11. Fecal coliform calibration at Site 8 East Fork Flint Creek

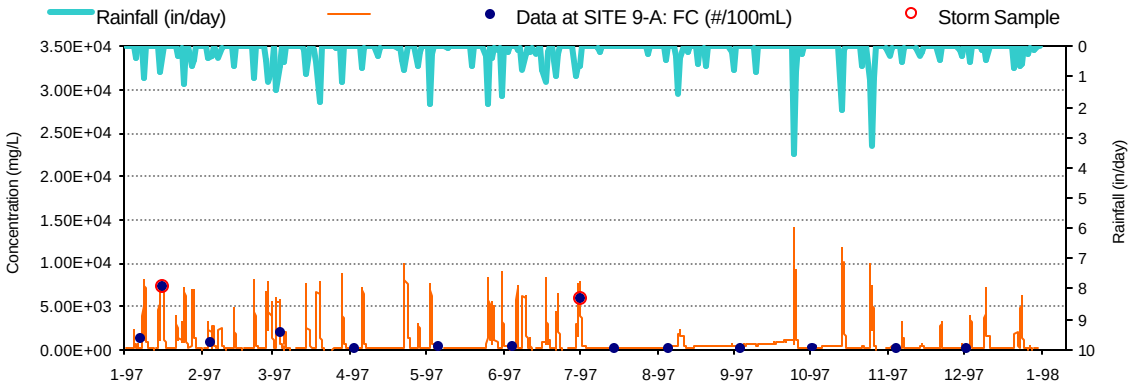

Figure F-12. Fecal coliform calibration at Site 9-A West Flint Creek

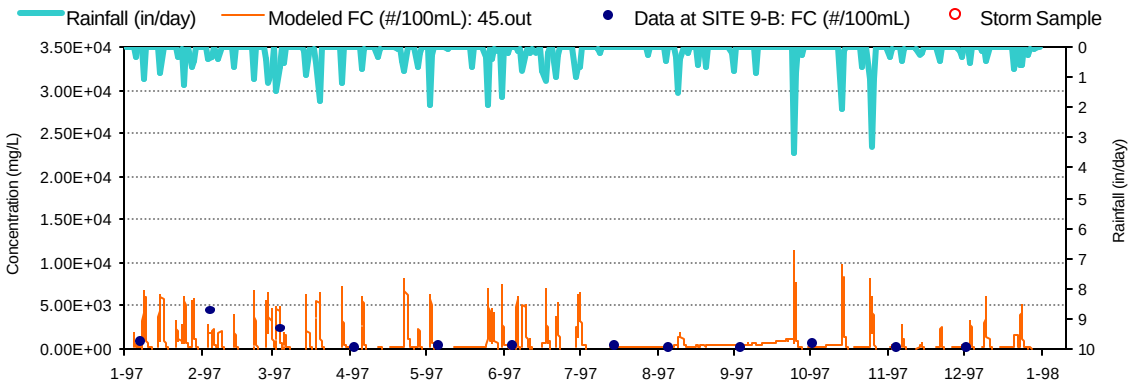

Figure F-13. Fecal coliform calibration at Site 9B West Flint Creek

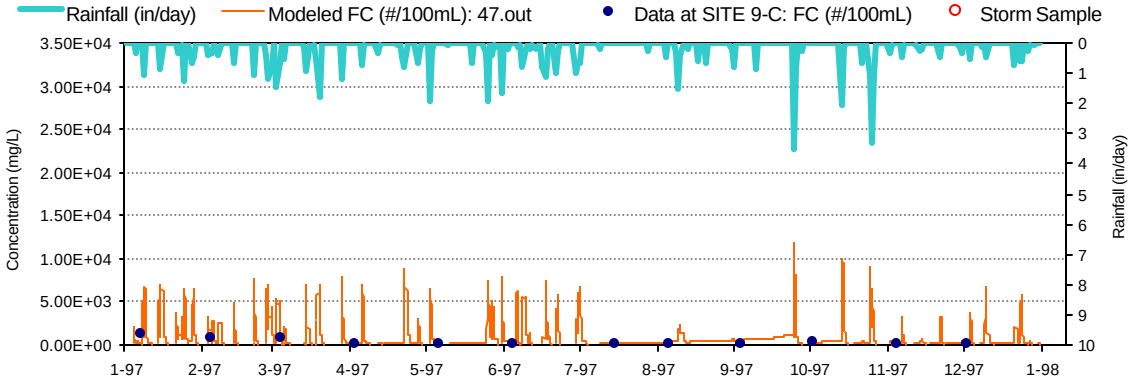

Figure F-14. Fecal coliform calibration at Site 9C West Flint Creek

Appendix G

TMDLs by Subwatershed

1.3 East Fork Flint Creek

Subwatershed 42

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	8.05E+06	0%	8.05E+06
Cropland	5.92E+11	0%	5.92E+11
Forest	5.49E+08	0%	5.49E+08
Pasture	1.04E+12	0%	1.04E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.01E+07	0%	2.01E+07
Wetlands	3.49E+05	0%	3.49E+05
Urban Impervious	1.12E+08	0%	1.12E+08
Harvested Wood	2.76E+07	0%	2.76E+07
Failing Septic Systems	4.25E+09	5%	2.12E+08
Cattle in the	4.13E+09	5%	2.06E+08

Stream			
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.64E+12**	***Load Allocation***	**1.63E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.63E+12**

1.4 East Fork Flint Creek

Subwatershed 43

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	3.55E+11	0%	3.55E+11
Forest	2.94E+08	0%	2.94E+08
Pasture	6.35E+11	0%	6.35E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.64E+05	0%	3.64E+05
Wetlands	7.00E+05	0%	7.00E+05
Urban Impervious	5.46E+06	0%	5.46E+06
Harvested Wood	1.20E+07	0%	1.20E+07
Failing Septic Systems	2.59E+09	0%	2.59E+09
Cattle in the Stream	8.09E+08	0%	8.09E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00

Total Existing Load	**9.94E+11**	**Load Allocation**	**9.94E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**9.94E+11**

1.5 Flint Creek

Subwatershed 9

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.17E+11	0%	1.17E+11
Forest	1.22E+08	0%	1.22E+08
Pasture	4.46E+11	0%	4.46E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	9.02E+06	0%	9.02E+06
Wetlands	2.45E+07	0%	2.45E+07
Urban Impervious	1.04E+07	0%	1.04E+07
Harvested Wood	2.71E+06	0%	2.71E+06
Failing Septic Systems	3.74E+09	0%	3.74E+09
Cattle in the Stream	3.19E+09	0%	3.19E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.70E+11**	**Load Allocation**	**5.70E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**5.70E+11**

1.6 Flint Creek

Subwatershed 10

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.91E+09	0%	6.91E+09
Forest	6.76E+06	0%	6.76E+06
Pasture	4.29E+10	0%	4.29E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.20E+05	0%	1.20E+05
Wetlands	2.10E+06	0%	2.10E+06
Urban Impervious	1.82E+06	0%	1.82E+06
Harvested Wood	1.71E+05	0%	1.71E+05
Failing Septic Systems	3.65E+08	0%	3.65E+08
Cattle in the Stream	3.12E+08	0%	3.12E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.05E+10**	**Load Allocation**	5.05E+10
		Wasteload Allocation	0.00E+00
		TMDL	5.05E+10

1.7 Flint Creek

Subwatershed 13

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.95E+11	0%	1.95E+11
Forest	1.82E+08	0%	1.82E+08
Pasture	4.69E+11	0%	4.69E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.38E+08	0%	1.38E+08
Wetlands	4.97E+07	0%	4.97E+07
Urban Impervious	9.74E+07	0%	9.74E+07
Harvested Wood	4.03E+06	0%	4.03E+06
Failing Septic Systems	3.65E+09	0%	3.65E+09
Cattle in the Stream	3.12E+09	0%	3.12E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**6.71E+11**	**Load Allocation**	6.71E+11
		Wasteload Allocation	0.00E+00
		TMDL	6.71E+11

1.8 Flint Creek

Subwatershed 20

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.06E+10	0%	6.06E+10
Forest	3.26E+07	0%	3.26E+07
Pasture	9.70E+10	0%	9.70E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.44E+05	0%	2.44E+05
Wetlands	2.45E+07	0%	2.45E+07
Urban Impervious	3.64E+06	0%	3.64E+06
Harvested Wood	6.73E+05	0%	6.73E+05
Failing Septic Systems	3.86E+08	0%	3.86E+08
Cattle in the Stream	6.74E+09	0%	6.74E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.65E+11**	**Load Allocation**	**1.65E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.65E+11**

1.9 Flint Creek

Subwatershed 21

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.44E+11	0%	1.44E+11
Forest	6.15E+07	0%	6.15E+07
Pasture	4.59E+11	0%	4.59E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.55E+05	0%	3.55E+05
Wetlands	5.21E+07	0%	5.21E+07
Urban Impervious	7.27E+06	0%	7.27E+06
Harvested Wood	2.02E+06	0%	2.02E+06
Failing Septic Systems	2.66E+09	0%	2.66E+09
Cattle in the Stream	2.42E+08	0%	2.42E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**6.06E+11**	**Load Allocation**	**6.06E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**6.06E+11**

1.10 Flint Creek

Subwatershed 23

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.46E+10	0%	1.46E+10
Forest	2.25E+07	0%	2.25E+07
Pasture	2.32E+10	0%	2.32E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.54E+06	0%	1.54E+06
Wetlands	2.10E+06	0%	2.10E+06
Urban Impervious	2.33E+06	0%	2.33E+06
Harvested Wood	5.41E+05	0%	5.41E+05
Failing Septic Systems	9.43E+07	0%	9.43E+07
Cattle in the Stream	6.86E+09	0%	6.86E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**4.48E+10**	**Load Allocation**	**4.48E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**4.48E+10**

1.11 Flint Creek

Subwatershed 24

Source	Existing Loading Fecal Coliform	Estimated Percent	Allocated Load (counts/day)

	(counts/day)	Reduction	
Barren	0.00E+00	0%	0.00E+00
Cropland	2.10E+11	0%	2.10E+11
Forest	7.92E+07	0%	7.92E+07
Pasture	3.65E+11	0%	3.65E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.65E+07	0%	1.65E+07
Wetlands	3.43E+07	0%	3.43E+07
Urban Impervious	2.26E+07	0%	2.26E+07
Harvested Wood	1.94E+06	0%	1.94E+06
Failing Septic Systems	1.45E+09	0%	1.45E+09
Cattle in the Stream	8.62E+09	0%	8.62E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.85E+11**	**Load Allocation**	**5.85E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**5.85E+11**

1.12 Flint Creek

Subwatershed 28

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	0.00E+00	0%	0.00E+00
Forest	8.92E+06	0%	8.92E+06
Pasture	0.00E+00	0%	0.00E+00

Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	9.44E+06	0%	9.44E+06
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	2.01E+05	0%	2.01E+05
Failing Septic Systems	0.00E+00	0%	0.00E+00
Cattle in the Stream	7.75E+09	0%	7.75E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**7.77E+09**	**Load Allocation**	**7.77E+09**
		Wasteload Allocation	**0.00E+00**
		TMDL	**7.77E+09**

1.13 Flint Creek

Subwatershed 30

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	0.00E+00	0%	0.00E+00
Forest	0.00E+00	0%	0.00E+00
Pasture	0.00E+00	0%	0.00E+00
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	1.40E+06	0%	1.40E+06
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	0.00E+00	0%	0.00E+00

Failing Septic Systems	0.00E+00	0%	0.00E+00
Cattle in the Stream	5.78E+09	0%	5.78E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.79E+09**	**Load Allocation**	**5.79E+09**
		Wasteload Allocation	**0.00E+00**
		TMDL	**5.79E+09**

1.14 Flint Creek

Subwatershed 32

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	7.83E+10	0%	7.83E+10
Forest	3.30E+07	0%	3.30E+07
Pasture	2.39E+11	0%	2.39E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.20E+05	0%	1.20E+05
Wetlands	2.94E+07	0%	2.94E+07
Urban Impervious	1.82E+06	0%	1.82E+06
Harvested Wood	7.71E+05	0%	7.71E+05
Failing Septic Systems	9.79E+08	0%	9.79E+08
Cattle in the Stream	2.86E+09	0%	2.86E+09
Municipal Point Sources (Falkville)	9.79E+09	0%	9.79E+09

Total Existing Load	**3.31E+11**	**Load Allocation**	**3.21E+11**
		Wasteload Allocation	**9.79E+09**
		TMDL	**3.31E+11**

1.15 Flint Creek

Subwatershed 34

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	0.00E+00	0%	0.00E+00
Forest	3.32E+05	0%	3.32E+05
Pasture	8.57E+08	0%	8.57E+08
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	1.75E+06	0%	1.75E+06
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	5.57E+03	0%	5.57E+03
Failing Septic Systems	4.01E+06	0%	4.01E+06
Cattle in the Stream	3.86E+09	0%	3.86E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**4.73E+09**	**Load Allocation**	**4.73E+09**
		Wasteload Allocation	**0.00E+00**
		TMDL	**4.73E+09**

1.16 Flint Creek

Subwatershed 36

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	4.03E+06	0%	4.03E+06
Cropland	2.48E+11	0%	2.48E+11
Forest	5.31E+08	0%	5.31E+08
Pasture	6.47E+11	0%	6.47E+11
Strip Mining	2.15E+07	0%	2.15E+07
Urban Pervious	3.51E+06	0%	3.51E+06
Wetlands	8.04E+07	0%	8.04E+07
Urban Impervious	5.28E+07	0%	5.28E+07
Harvested Wood	1.38E+07	0%	1.38E+07
Failing Septic Systems	2.66E+09	0%	2.66E+09
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**8.98E+11**	**Load Allocation**	**8.98E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**8.98E+11**

1.17 Flint Creek

Subwatershed 38

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	0.00E+00	0%	0.00E+00
Forest	0.00E+00	0%	0.00E+00
Pasture	8.57E+08	0%	8.57E+08
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	0.00E+00	0%	0.00E+00
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	0.00E+00	0%	0.00E+00
Failing Septic Systems	4.01E+06	0%	4.01E+06
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**8.61E+08**	**Load Allocation**	**8.61E+08**
		Wasteload Allocation	**0.00E+00**
		TMDL	**8.61E+08**

1.18 Flint Creek

Subwatershed 40

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	4.03E+06	0%	4.03E+06
Cropland	3.38E+10	0%	3.38E+10
Forest	1.13E+08	0%	1.13E+08
Pasture	6.27E+10	0%	6.27E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.64E+05	0%	3.64E+05
Wetlands	4.55E+06	0%	4.55E+06
Urban Impervious	5.46E+06	0%	5.46E+06
Harvested Wood	5.34E+06	0%	5.34E+06
Failing Septic Systems	2.57E+08	0%	2.57E+08
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**9.69E+10**	**Load Allocation**	**9.69E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**9.69E+10**

1.19 Rock Creek

Subwatershed 41

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.89E+11	0%	1.89E+11
Forest	1.85E+08	0%	1.85E+08
Pasture	5.76E+11	0%	5.76E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.02E+07	0%	1.02E+07
Wetlands	0.00E+00	0%	0.00E+00
Urban Impervious	1.79E+07	0%	1.79E+07
Harvested Wood	9.92E+06	0%	9.92E+06
Failing Septic Systems	2.30E+09	0%	2.30E+09
Cattle in the Stream	3.70E+08	0%	3.70E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**7.68E+11**	**Load Allocation**	**7.68E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**7.68E+11**

1.20 Mill Creek

Subwatershed 39

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	1.98E+07	0%	1.98E+07
Cropland	3.87E+11	0%	3.87E+11
Forest	9.45E+08	0%	9.45E+08
Pasture	9.64E+11	0%	9.64E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.84E+05	0%	4.84E+05
Wetlands	1.12E+07	0%	1.12E+07
Urban Impervious	7.27E+06	0%	7.27E+06
Harvested Wood	2.17E+07	0%	2.17E+07
Failing Septic Systems	3.96E+09	35%	1.39E+09
Cattle in the Stream	1.05E+10	35%	3.67E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.37E+12**	**Load Allocation**	**1.36E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.36E+12**

1.21 Indian Creek

Subwatershed 37

Source	Existing Loading Fecal Coliform	Estimated Percent	Allocated Load (counts/day)

	(counts/day)	Reduction	
Barren	1.10E+07	0%	1.10E+07
Cropland	1.50E+11	0%	1.50E+11
Forest	2.04E+08	0%	2.04E+08
Pasture	3.25E+11	0%	3.25E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	5.57E+06	0%	5.57E+06
Wetlands	9.09E+06	0%	9.09E+06
Urban Impervious	4.95E+07	0%	4.95E+07
Harvested Wood	9.62E+06	0%	9.62E+06
Failing Septic Systems	1.32E+09	87%	1.15E+09
Cattle in the Stream	1.88E+10	87%	1.64E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**4.95E+11**	**Load Allocation**	**4.93E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**4.93E+11**

1.22 Jones Branch

Subwatershed 35

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.45E+11	0%	1.45E+11
Forest	8.48E+07	0%	8.48E+07
Pasture	4.83E+11	0%	4.83E+11

Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.44E+05	0%	2.44E+05
Wetlands	1.26E+07	0%	1.26E+07
Urban Impervious	3.64E+06	0%	3.64E+06
Harvested Wood	1.85E+06	0%	1.85E+06
Failing Septic Systems	1.98E+09	0%	1.98E+09
Cattle in the Stream	1.17E+07	0%	1.17E+07
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**6.30E+11**	**Load Allocation**	**6.30E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**6.30E+11**

1.23 Robinson Creek

Subwatershed 33

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	7.32E+05	0%	7.32E+05
Cropland	2.95E+11	0%	2.95E+11
Forest	2.76E+08	0%	2.76E+08
Pasture	9.15E+11	0%	9.15E+11
Strip Mining	4.52E+07	0%	4.52E+07
Urban Pervious	1.64E+07	0%	1.64E+07
Wetlands	3.15E+07	0%	3.15E+07
Urban Impervious	1.43E+08	0%	1.43E+08
Harvested Wood	6.31E+06	0%	6.31E+06

Failing Septic Systems	3.70E+09	0%	3.70E+09
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.21E+12**	**Load Allocation**	**1.21E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.21E+12**

1.24 Painter Branch

Subwatershed 31

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	3.65E+05	0%	3.65E+05
Cropland	1.50E+11	0%	1.50E+11
Forest	9.18E+07	0%	9.18E+07
Pasture	6.55E+11	0%	6.55E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.08E+07	0%	4.08E+07
Wetlands	1.61E+07	0%	1.61E+07
Urban Impervious	1.32E+08	0%	1.32E+08
Harvested Wood	2.21E+06	0%	2.21E+06
Failing Septic Systems	2.62E+09	0%	2.62E+09
Cattle in the Stream	1.17E+07	0%	1.17E+07
Municipal Point Sources	0.00E+00	0%	0.00E+00

Total Existing Load	**8.08E+11**	**Load Allocation**	**8.08E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**8.08E+11**

1.25 Cedar Creek

Subwatershed 29

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	1.50E+07	0%	1.50E+07
Cropland	8.59E+11	0%	8.59E+11
Forest	6.91E+08	0%	6.91E+08
Pasture	2.10E+12	0%	2.10E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.00E+07	0%	2.00E+07
Wetlands	6.99E+07	0%	6.99E+07
Urban Impervious	2.27E+08	0%	2.27E+08
Harvested Wood	1.69E+07	0%	1.69E+07
Failing Septic Systems	8.54E+09	50%	4.39E+09
Cattle in the Stream	1.68E+10	50%	8.42E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.99E+12**	**Load Allocation**	**2.97E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.97E+12**

1.26 Shoal Creek

Subwatershed 25

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.33E+11	0%	1.33E+11
Forest	6.43E+07	0%	6.43E+07
Pasture	1.50E+11	0%	1.50E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.27E+08	0%	1.27E+08
Wetlands	4.90E+06	0%	4.90E+06
Urban Impervious	2.54E+08	0%	2.54E+08
Harvested Wood	1.63E+06	0%	1.63E+06
Failing Septic Systems	3.50E+08	0%	3.50E+08
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources (Hartselle)	1.58E+10	0%	1.58E+10
Total Existing Load	**3.00E+11**	**Load Allocation**	**2.84E+11**
		Wasteload Allocation	**1.58E+10**
		TMDL	**3.00E+11**

1.27 Shoal Creek

Subwatershed 27

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	5.83E+11	0%	5.83E+11
Forest	3.65E+08	0%	3.65E+08
Pasture	7.11E+11	0%	7.11E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	8.01E+07	0%	8.01E+07
Wetlands	5.07E+07	0%	5.07E+07
Urban Impervious	1.62E+08	0%	1.62E+08
Harvested Wood	9.16E+06	0%	9.16E+06
Failing Septic Systems	2.86E+09	30%	8.57E+08
Cattle in the Stream	2.86E+09	30%	8.57E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.30E+12**	**Load Allocation**	1.30E+12
		Wasteload Allocation	0.00E+00
		TMDL	1.30E+12

1.28 Town Branch

Subwatershed 26

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	2.92E+10	0%	2.92E+10
Forest	2.85E+07	0%	2.85E+07
Pasture	6.27E+10	0%	6.27E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.22E+08	0%	1.22E+08
Wetlands	1.40E+06	0%	1.40E+06
Urban Impervious	2.57E+08	0%	2.57E+08
Harvested Wood	7.30E+05	0%	7.30E+05
Failing Septic Systems	1.31E+08	98.50%	1.29E+08
Cattle in the Stream	6.31E+10	98.50%	6.22E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.56E+11**	**Load Allocation**	1.55E+11
		Wasteload Allocation	0.00E+00
		TMDL	1.55E+11

1.29 Mack Creek

Subwatershed 22

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	3.84E+11	0%	3.84E+11
Forest	2.05E+08	0%	2.05E+08
Pasture	8.15E+11	0%	8.15E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	9.53E+05	0%	9.53E+05
Wetlands	5.18E+07	0%	5.18E+07
Urban Impervious	3.89E+06	0%	3.89E+06
Harvested Wood	4.44E+06	0%	4.44E+06
Failing Septic Systems	3.34E+09	80%	2.66E+09
Cattle in the Stream	1.74E+10	80%	1.39E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.22E+12**	**Load Allocation**	**1.22E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.22E+12**

1.30 Jones Creek

Subwatershed 18

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	1.46E+06	0%	1.46E+06
Cropland	2.81E+11	0%	2.81E+11
Forest	2.92E+08	0%	2.92E+08
Pasture	8.97E+11	0%	8.97E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.84E+05	0%	4.84E+05
Wetlands	9.09E+07	0%	9.09E+07
Urban Impervious	7.27E+06	0%	7.27E+06
Harvested Wood	7.82E+06	0%	7.82E+06
Failing Septic Systems	2.31E+10	86%	1.99E+10
Cattle in the Stream	1.59E+10	86%	1.37E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.22E+12**	**Load Allocation**	**1.21E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.21E+12**

1.31 Crowdabout Creek

Subwatershed 19

Source	Existing Loading Fecal Coliform	Estimated Percent	Allocated Load (counts/day)

	(counts/day)	Reduction	
Barren	3.29E+07	0%	3.29E+07
Cropland	4.92E+11	0%	4.92E+11
Forest	4.31E+08	0%	4.31E+08
Pasture	1.50E+12	0%	1.50E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	9.77E+05	0%	9.77E+05
Wetlands	1.15E+08	0%	1.15E+08
Urban Impervious	2.00E+07	0%	2.00E+07
Harvested Wood	1.37E+07	0%	1.37E+07
Failing Septic Systems	5.45E+10	86%	4.68E+10
Cattle in the Stream	3.74E+10	86%	3.22E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.08E+12**	**Load Allocation**	**2.07E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.07E+12**

1.32 Crowdabout Creek

Subwatershed 17

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	5.40E+08	0%	5.40E+08
Forest	1.08E+05	0%	1.08E+05
Pasture	0.00E+00	0%	0.00E+00

Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	8.75E+05	0%	8.75E+05
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	5.57E+03	0%	5.57E+03
Failing Septic Systems	0.00E+00	0%	0.00E+00
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.41E+08**	***Load Allocation***	5.41E+08
		Wasteload Allocation	0.00E+00
		TMDL	5.41E+08

1.33 Crowdabout Creek

Subwatershed 15

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	7.19E+10	0%	7.19E+10
Forest	1.52E+07	0%	1.52E+07
Pasture	1.38E+11	0%	1.38E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	8.79E+04	0%	8.79E+04
Wetlands	4.31E+07	0%	4.31E+07

Urban Impervious	1.82E+06	0%	1.82E+06
Harvested Wood	4.79E+05	0%	4.79E+05
Failing Septic Systems	5.02E+09	82%	4.10E+09
Cattle in the Stream	3.46E+09	82%	2.83E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.18E+11**	**Load Allocation**	**2.17E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.17E+11**

1.34 Crowdabout Creek

Subwatershed 14

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	3.05E+11	0%	3.05E+11
Forest	6.14E+07	0%	6.14E+07
Pasture	8.53E+11	0%	8.53E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	5.34E+05	0%	5.34E+05
Wetlands	1.44E+08	0%	1.44E+08
Urban Impervious	1.09E+07	0%	1.09E+07
Harvested Wood	2.03E+06	0%	2.03E+06
Failing Septic Systems	3.10E+10	87%	2.69E+10
Cattle in the	2.14E+10	87%	1.86E+10

Stream			
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.21E+12**	**Load Allocation**	**1.20E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.20E+12**

1.35 Herrin Creek

Subwatershed 16

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	1.46E+06	0%	1.46E+06
Cropland	2.13E+11	0%	2.13E+11
Forest	1.74E+08	0%	1.74E+08
Pasture	8.53E+11	0%	8.53E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	6.08E+05	0%	6.08E+05
Wetlands	4.83E+07	0%	4.83E+07
Urban Impervious	9.11E+06	0%	9.11E+06
Harvested Wood	4.30E+06	0%	4.30E+06
Failing Septic Systems	2.20E+10	88%	1.93E+10
Cattle in the Stream	1.51E+10	88%	1.33E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing	**1.10E+12**	**Load Allocation**	**1.10E+12**

Load		**Wasteload Allocation**	**0.00E+00**
		TMDL	**1.10E+12**

1.36 No Business Creek

Subwatershed 12

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	7.68E+06	0%	7.68E+06
Cropland	7.76E+11	0%	7.76E+11
Forest	1.69E+08	0%	1.69E+08
Pasture	1.18E+12	0%	1.18E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	7.03E+06	0%	7.03E+06
Wetlands	1.71E+08	0%	1.71E+08
Urban Impervious	3.67E+07	0%	3.67E+07
Harvested Wood	2.86E+06	0%	2.86E+06
Failing Septic Systems	1.40E+10	75%	1.05E+10
Cattle in the Stream	1.92E+10	75%	1.44E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.99E+12**	**Load Allocation**	**1.98E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.98E+12**

1.37 No Business Creek

Subwatershed 11

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	5.99E+11	0%	5.99E+11
Forest	2.12E+08	0%	2.12E+08
Pasture	1.63E+12	0%	1.63E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.94E+06	0%	3.94E+06
Wetlands	3.11E+08	0%	3.11E+08
Urban Impervious	2.86E+07	0%	2.86E+07
Harvested Wood	7.16E+06	0%	7.16E+06
Failing Septic Systems	1.94E+10	73%	1.42E+10
Cattle in the Stream	2.66E+10	73%	1.94E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.28E+12**	**Load Allocation**	**2.26E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.26E+12**

1.38 West Flint Creek

Subwatershed 44

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.26E+11	60%	5.03E+10
Forest	3.33E+08	0%	3.33E+08
Pasture	3.62E+11	60%	1.45E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.16E+07	0%	3.16E+07
Wetlands	1.93E+08	0%	1.93E+08
Urban Impervious	2.34E+07	0%	2.34E+07
Harvested Wood	7.31E+06	0%	7.31E+06
Failing Septic Systems	2.98E+09	55%	1.64E+09
Cattle in the Stream	3.65E+09	55%	2.01E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**4.95E+11**	**Load Allocation**	**2.00E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.00E+11**

1.39 West Flint Creek

Subwatershed 45

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	3.65E+05	0%	3.66E+05
Cropland	1.63E+11	60%	6.53E+10
Forest	2.05E+08	0%	2.05E+08
Pasture	5.52E+11	60%	2.21E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.92E+06	0%	1.92E+06
Wetlands	8.40E+07	0%	8.40E+07
Urban Impervious	8.06E+06	0%	8.05E+06
Harvested Wood	7.12E+06	0%	7.12E+06
Failing Septic Systems	6.58E+09	55%	3.62E+09
Cattle in the Stream	8.02E+09	55%	4.42E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**7.30E+11**	**Load Allocation**	**2.95E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.95E+11**

1.40 West Flint Creek

Subwatershed 47

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	3.23E+11	65%	1.13E+11
Forest	2.54E+08	0%	2.54E+08
Pasture	8.84E+11	65%	3.09E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.65E+06	0%	2.65E+06
Wetlands	9.43E+07	0%	9.43E+07
Urban Impervious	9.70E+06	0%	9.70E+06
Harvested Wood	5.27E+06	0%	5.27E+06
Failing Septic Systems	1.04E+10	90%	9.41E+09
Cattle in the Stream	1.27E+10	90%	1.14E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.23E+12**	**Load Allocation**	**4.43E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**4.43E+11**

1.41 West Flint Creek

Subwatershed 49

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	5.95E+09	65%	2.08E+09
Forest	4.53E+06	0%	4.53E+06
Pasture	2.74E+10	65%	9.57E+09
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	2.41E+06	0%	2.41E+06
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	1.67E+04	0%	1.67E+04
Failing Septic Systems	1.21E+09	90%	1.09E+09
Cattle in the Stream	2.18E+08	90%	1.96E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**3.48E+10**	**Load Allocation**	**1.29E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.29E+10**

1.42 West Flint Creek

Subwatershed 51

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	5.03E+10	65%	1.76E+10

Forest	2.53E+07	0%	2.53E+07
Pasture	1.87E+11	65%	6.55E+10
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	3.41E+07	0%	3.41E+07
Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	9.48E+04	0%	9.48E+04
Failing Septic Systems	8.21E+09	90%	7.39E+09
Cattle in the Stream	1.48E+09	90%	1.33E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.47E+11**	**Load Allocation**	**9.19E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**9.19E+10**

1.43 West Flint Creek

Subwatershed 53

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.30E+11	46%	7.04E+10
Forest	4.74E+07	0%	4.74E+07
Pasture	4.27E+11	46%	2.30E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	0.00E+00	0%	0.00E+00
Wetlands	4.33E+07	0%	4.33E+07

Urban Impervious	0.00E+00	0%	0.00E+00
Harvested Wood	1.62E+05	0%	1.62E+05
Failing Septic Systems	1.88E+10	90%	1.69E+10
Cattle in the Stream	3.38E+09	90%	3.05E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.79E+11**	**Load Allocation**	**3.20E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**3.20E+11**

1.44 West Flint Creek

Subwatershed 54

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	1.01E+08	0%	1.01E+08
Cropland	1.17E+12	46%	6.30E+11
Forest	1.32E+09	0%	1.32E+09
Pasture	2.27E+12	46%	1.23E+12
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.94E+06	0%	1.94E+06
Wetlands	3.35E+08	0%	3.35E+08
Urban Impervious	2.91E+07	0%	2.91E+07
Harvested Wood	3.04E+06	0%	3.04E+06
Failing Septic Systems	7.06E+10	90%	6.36E+10
Cattle in the	1.27E+10	90%	1.15E+10

Stream			
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**3.53E+12**	**Load Allocation**	**1.94E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.94E+12**

1.45 Rocky Branch

Subwatershed 56

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	5.49E+06	0%	5.49E+06
Cropland	2.69E+11	46%	1.45E+11
Forest	7.12E+07	0%	7.12E+07
Pasture	5.43E+11	46%	2.93E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	6.12E+05	0%	6.12E+05
Wetlands	5.82E+07	0%	5.82E+07
Urban Impervious	2.08E+06	0%	2.08E+06
Harvested Wood	2.49E+05	0%	2.49E+05
Failing Septic Systems	2.40E+10	90%	2.16E+10
Cattle in the Stream	6.24E+09	90%	5.62E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing	**8.42E+11**	**Load Allocation**	**4.65E+11**

Load		**Wasteload Allocation**	**0.00E+00**
		TMDL	**4.65E+11**

1.46 Elam Creek

Subwatershed 55

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	1.71E+11	46%	9.23E+10
Forest	3.05E+07	0%	3.05E+07
Pasture	2.97E+11	46%	1.60E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.26E+06	0%	2.26E+06
Wetlands	2.56E+07	0%	2.56E+07
Urban Impervious	4.66E+06	0%	4.66E+06
Harvested Wood	1.00E+05	0%	1.00E+05
Failing Septic Systems	1.28E+10	90%	1.16E+10
Cattle in the Stream	3.34E+09	90%	3.00E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**4.84E+11**	**Load Allocation**	**2.67E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**2.67E+11**

1.47 Elam Creek

Subwatershed 57

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	4.50E+05	0%	4.50E+05
Cropland	7.69E+11	46%	4.15E+11
Forest	1.22E+08	0%	1.22E+08
Pasture	1.28E+12	46%	6.92E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.53E+06	0%	1.53E+06
Wetlands	1.81E+08	0%	1.81E+08
Urban Impervious	1.68E+07	0%	1.68E+07
Harvested Wood	4.06E+05	0%	4.06E+05
Failing Septic Systems	4.61E+10	90%	4.15E+10
Cattle in the Stream	1.20E+10	90%	1.08E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**2.11E+12**	**Load Allocation**	**1.16E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.16E+12**

1.48 Elam Creek

Subwatershed 58

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.97E+10	46%	3.76E+10
Forest	3.53E+08	0%	3.53E+08
Pasture	4.78E+11	46%	2.58E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	7.52E+05	0%	7.52E+05
Wetlands	8.32E+07	0%	8.32E+07
Urban Impervious	1.03E+07	0%	1.03E+07
Harvested Wood	7.62E+05	0%	7.62E+05
Failing Septic Systems	1.21E+10	90%	1.09E+10
Cattle in the Stream	3.14E+09	90%	2.83E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.63E+11**	**Load Allocation**	**3.10E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**3.10E+11**

1.49 McDaniel Creek

Subwatershed 52

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	3.29E+06	0%	3.29E+06
Cropland	4.50E+11	65%	1.58E+11
Forest	1.95E+08	0%	1.95E+08
Pasture	1.11E+12	65%	3.90E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	3.66E+06	0%	3.66E+06
Wetlands	4.46E+07	0%	4.46E+07
Urban Impervious	1.25E+07	0%	1.25E+07
Harvested Wood	7.80E+05	0%	7.80E+05
Failing Septic Systems	4.92E+10	90%	4.44E+10
Cattle in the Stream	3.62E+10	90%	3.26E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.65E+12**	**Load Allocation**	**6.25E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**6.25E+11**

1.50 Big Shoal Creek

Subwatershed 50

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	7.89E+11	65%	2.76E+11
Forest	4.15E+08	0%	4.15E+08
Pasture	2.54E+12	65%	8.89E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.56E+07	0%	1.56E+07
Wetlands	2.18E+08	0%	2.18E+08
Urban Impervious	1.19E+08	0%	1.19E+08
Harvested Wood	9.53E+05	0%	9.53E+05
Failing Septic Systems	7.92E+10	90%	7.13E+10
Cattle in the Stream	1.35E+10	90%	1.21E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**3.42E+12**	**Load Allocation**	**1.25E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.25E+12**

1.51 Flat Creek

Subwatershed 48

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.24E+11	65%	2.18E+11
Forest	1.95E+08	0%	1.95E+08
Pasture	1.03E+12	65%	3.60E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	2.44E+07	0%	2.44E+07
Wetlands	6.16E+07	0%	6.16E+07
Urban Impervious	8.10E+07	0%	8.10E+07
Harvested Wood	4.07E+05	0%	4.07E+05
Failing Septic Systems	3.19E+10	90%	2.88E+10
Cattle in the Stream	7.08E+09	90%	6.38E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.69E+12**	**Load Allocation**	**6.14E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**6.14E+11**

Mud Tavern Creek
Subwatershed 46

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	2.79E+11	0%	2.79E+11

Forest	3.63E+08	0%	3.63E+08
Pasture	5.84E+11	0%	5.84E+11
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	1.31E+07	0%	1.31E+07
Wetlands	6.41E+07	0%	6.41E+07
Urban Impervious	9.17E+07	0%	9.17E+07
Harvested Wood	1.02E+07	0%	1.02E+07
Failing Septic Systems	6.72E+09	55%	3.70E+09
Cattle in the Stream	7.75E+09	55%	4.27E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**8.78E+11**	**Load Allocation**	**8.72E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**8.72E+11**

Flint Creek
Subwatershed 8

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.14E+09	0%	6.14E+09
Forest	2.81E+07	0%	2.81E+07

Pasture	6.01E+09	0%	6.01E+09
Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.84E+05	0%	4.84E+05
Wetlands	1.68E+07	0%	1.68E+07
Urban Impervious	7.27E+06	0%	7.27E+06
Harvested Wood	6.34E+05	0%	6.34E+05
Failing Septic Systems	4.54E+07	0%	4.54E+07
Cattle in the Stream	0.00E+00	0%	0.00E+00
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.22E+10**	**Load Allocation**	**1.22E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.22E+10**

Flint Creek
Subwatershed 5

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/day)
Barren	0.00E+00	0%	0.00E+00
Cropland	4.39E+11	0%	4.39E+11
Forest	1.82E+08	0%	1.82E+08
Pasture	6.95E+11	0%	6.95E+11
Strip Mining	0.00E+00	0%	0.00E+00

Urban Pervious	1.12E+08	0%	1.12E+08
Wetlands	1.01E+08	0%	1.01E+08
Urban Impervious	5.39E+08	0%	5.39E+08
Harvested Wood	6.22E+06	0%	6.22E+06
Failing Septic Systems	7.25E+09	0%	7.25E+09
Cattle in the Stream	1.28E+10	0%	1.28E+10
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**1.15E+12**	**Load Allocation**	**1.15E+12**
		Wasteload Allocation	**0.00E+00**
		TMDL	**1.15E+12**

Village Branch

Subwatershed 6

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/hr)
Barren	0.00E+00	0%	0.00E+00
Cropland	6.90E+09	0%	6.90E+09
Forest	4.44E+07	0%	4.44E+07
Pasture	4.29E+10	0%	4.29E+10

Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.85E+05	0%	4.85E+05
Wetlands	4.13E+07	0%	4.13E+07
Urban Impervious	7.28E+06	0%	7.28E+06
Harvested Wood	1.07E+06	0%	1.07E+06
Failing Septic Systems	3.64E+08	0%	3.64E+08
Cattle in the Stream	5.66E+08	0%	5.66E+08
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**5.08E+10**	**Load Allocation**	**5.08E+10**
		Wasteload Allocation	**0.00E+00**
		TMDL	**5.08E+10**

Village Branch
Subwatershed 7

Source	Existing Loading Fecal Coliform (counts/day)	Estimated Percent Reduction	Allocated Load (counts/hr)
Barren	1.87E+07	0%	1.87E+07
Cropland	2.99E+11	0%	2.99E+11
Forest	4.10E+08	0%	4.10E+08
Pasture	5.67E+11	0%	5.67E+11

Strip Mining	0.00E+00	0%	0.00E+00
Urban Pervious	4.22E+07	0%	4.22E+07
Wetlands	7.73E+07	0%	7.73E+07
Urban Impervious	1.19E+08	0%	1.19E+08
Harvested Wood	9.85E+06	0%	9.85E+06
Failing Septic Systems	4.70E+09	0%	4.70E+09
Cattle in the Stream	7.32E+09	0%	7.32E+09
Municipal Point Sources	0.00E+00	0%	0.00E+00
Total Existing Load	**8.79E+11**	**Load Allocation**	**8.79E+11**
		Wasteload Allocation	**0.00E+00**
		TMDL	**8.79E+11**